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A review of the *Solenopsis* genus-group and revision of Afrotropical *Monomorium* Mayr (Hymenoptera: Formicidae)

Barry Bolton

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Synopsis

A review is presented of the 13 genera currently taken to constitute the *Solenopsis*-group, which is redefined here. The genus-group in the sense of this paper includes three former groups, the *Monomorium*-, *Megalomyrmex*-, and *Solenopsis*-groups, combined. Extensive modifications to the genera formerly included in the first of these are proposed, including the new synonymy of *Syllophopsis* Santschi and *Chelaner* Emery under *Monomorium* Mayr, the reinstatement of *Phacota* Roger and *Bondroitia* Forel as

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valid genera, and the exclusion of *Hagioxenus* Forel from the group. The genera *Tranopelta* Mayr and *Ochetomyrmex* Mayr (= *Brownidris* Kusnezov) are newly excluded from the group and the previous provisional synonym of *Monomorium*, *Xenoaphaenogaster* Baroni Urbani, is transferred out of the group and newly synonymized with *Pheidole* Westwood. One new genus, *Epelysidris*, is described from Borneo. The status of *Diplorhoptrum* Mayr as a separate genus is considered and rejected and a key to recognized genera is presented. Treatment of individual genera varies from a short review of current knowledge to a redefinition and revision of some smaller genera (*Anillomyrma* Emery, *Bondroitia* Forel, *Diplomorium* Mayr). The very large genus *Monomorium* is reviewed and redefined on a world-wide basis and its extensive genus-level synonymy is discussed in detail. The former genera and subgenera now synonymized with *Monomorium* are fitted into a system of informal species-groups which are defined and discussed on a world-wide basis. A new name is proposed for the type-species of *Monomorium*, which is preoccupied, and the authorship and publication date of *M. antarcticum* (Smith) is investigated. The large Afrotropical fauna of *Monomorium* is fully revised and keyed, and contains 145 species in 8 species-groups. The latter are keyed separately and only two species-groups are confined to the Afrotropical region. Of the 145 species currently recognized as valid, 46 are described as new in this paper and 35 are newly elevated to species-rank from former infraspecific status; 43 new species-level synonyms are proposed, mostly of former infraspecific forms.

Introduction and history

This survey began as a taxonomic revision of the Afrotropical species of the large genus *Monomorium* Mayr. However, whilst examining the world fauna of this genus and its relatives prior to commencing the revision, it became apparent that much remained to be done, both at genus and genus-group level, with all the taxa related to *Monomorium* and *Solenopsis* Westwood. It is hoped that the results discussed here will help to dispel at least a little of the taxonomic and nomenclatural fog which still surrounds many genera, and perhaps clear the way for more detail systematic or phylogenetic work.

The study presented here gives an historical review of the genus-level taxonomy of the group, redefines the group as I currently view it, and goes on to discuss each included genus in greater or lesser detail. For several genera this review amounts to little more than a short synopsis of recent developments, but several smaller genera are treated in greater detail and are redefined. The large genus *Monomorium* has received most attention and a summary and discussion of the genus and its synonyms on a world-wide basis is given prior to the formal revision of the large Afrotropical fauna. This last section is a continuation of the series aimed towards a revision of the Afrotropical Myrmicinae. Previous parts include Bolton 1976, 1980, 1981*a*, 1981*b*, 1982, 1983, 1985, 1986*a*.

As conceived here, for the reasons discussed in detail below, the *Solenopsis* genus-group contains 13 genera, most of which are relatively small and of limited zoogeographical distribution. Two genera are however very large and of world-wide occurrence, and include a number of extremely successful tramp-species. An idea of the sizes and rangs of the genera, in terms of endemic species, may be gleaned from the following table. The number of species in the larger genera is very much an approximation as their species-level taxonomy remains utterly uninvestigated over the greater part of their ranges.

Genus	**Distribution**	**Number of species**
Monomorium Mayr	World wide (mainly Old World tropics)	*ca* 300
Solenopsis Westwood	World wide (mainly New World tropics)	*ca* 200
Megalomyrmex Forel	Neotropical	25–30
Oxyepoecus Santschi	Neotropical	11
Allomerus Mayr	Neotropical	4
Carebarella Emery	Neotropical	4
Nothidris Ettershank	Neotropical	3
Anillomyrma Emery	Oriental & Indo-Australian	2
Bondroitia Forel	Afrotropical	2
Antichthonidris Snelling	Neotropical	2
Diplomorium Mayr	Afrotropical	1

Epelysidris Bolton	Indo-Australian	1
Phacota Roger	Palaearctic	1

Earlier attempts at a classification of the myrmicine ants by Emery (1895*d*, 1915), Wheeler (1910), and Forel (1917) culminated in the classical systems proposed by Emery (1922) and Wheeler (1922). The last author included *Solenopsis* and all its supposed relatives in a single tribe, the Solenopsidini. Emery (1922) basically recognised all the same genus-level names as Wheeler, but divided the mass of genera into two tribes, Pheidologetini plus Solenopsidini, and further created a number of subtribes within each of these.

The situation rested there without change until 1966, except for the addition of new genera and subgenera by various authors in the intervening years. Both of the 1922 classifications were unsatisfactory because of their vagueness of tribal-level definition. To some extent this was brought about by the inclusion of a number of disparate genera whose resemblances to *Solenopsis* or *Monomorium* were superficial and whose real affinities lay elsewhere. Also the problem of definition of the group was exacerbated by the fact that it was extensively used as a catch-all, to hold genera not obviously fitting anywhere else in the Myrmicinae.

In his genus-level study of the ants related to *Solenopsis* and *Pheidologeton* Mayr, Ettershank (1966) gave a synopsis of the earlier attempts to formulate a classification for these difficult taxa. He tabulated a summary up to 1966 of all genera and subgenera applied to the groups in these previous surveys, and set his own revised classification alongside. In short, where earlier authors had recognized one or two tribes, namely Solenopsidini or Solenopsidini and Pheidologetini, he recognized four genus-groups. One of these, the *Pheidologeton*-group, corresponded almost exactly with the old tribe Pheidologetini in the sense of Emery (1922), except that Ettershank (1966) included *Anisopheidole* Forel in the group (transferring it from the Pheidolini) and excluded *Trigonogaster* Forel and *Dyomorium* Donisthorpe, rightly synonymizing the latter with *Vollenhovia* Mayr. The *Pheidologeton*-group is considered valid here and is retained to contain the six genera which Ettershank included, namely *Anisopheidole*, *Carebara* Westwood, *Lophomyrmex* Emery, *Oligomyrmex* Mayr, *Paedalgus* Forel, *Pheidologeton*, and their synonyms as currently listed (Ettershank, 1966).

This group fits most of the characterization given for the expanded *Solenopsis*-group in the sense of this publication (see below), but two characters consistently differentiate the *Pheidologeton*-group from *Solenopsis* and its allies.

(1) The median clypeal seta is universally lacking in the *Pheidologeton*-group. (2) The forewings of males and females in the *Pheidologeton*-group have a closed radial cell formed by the distalmost portion of *Rs* arching to the leading edge of the wing apicad of the pterostigma, where it fuses with the marginal apex of *R* and closes the cell. (Both these are considered plesiomorphic here, their apomorphic states being exhibited by the *Solenopsis*-group.)

Other characters of interest in the *Pheidologeton*-group, but apparently not universal, include the following. The mandibles tend to have a straight masticatory margin which commonly meets the basal margin in a near right-angle, and the mandible usually has 5 or more teeth. (In the *Solenopsis*-group the masticatory margin tends to be oblique and usually has 5 or fewer, generally 4, teeth.) The antennal club is most frequently 2-segmented and the propodeum most often bears teeth or spines in the *Pheidologeton*-group.

Despite Ettershank's (1966) exclusion of *Trigonogaster* from any of his groups I suspect that it may be derived from the *Pheidologeton*-group but isolated by its very specialized body form and much reduced wing venation.

The tribe Solenopsidini in the sense of Emery (1922) was divided by Ettershank (1966) into the following three genus-groups.

Monomorium-group: *Anillomyrma*, *Chelaner* Emery, *Diplomorium*, *Hagioxenus* Forel, *Monomorium*, *Syllophopsis* Santschi, and their included synonyms.

Megalomyrmex-group: *Allomerus*, *Brownidris* Kusnezov, *Carebarella*, *Megalomyrmex*, *Nothidris*, *Tranopelta* Mayr, and their included synonyms.

Solenopsis-group: *Oxyepoecus*, *Solenopsis*, and their included synonyms.

Genera formerly included in the Solenopsidini but excluded prior to Ettershank's survey were

Tranopeltoides Wheeler, synonymized with *Crematogaster* Lund by Kempf (1960); and *Adlerzia* Forel, which Brown (1952) had transferred to tribe Pheidolini. Ettershank (1966) further excluded *Vollenhovia* (= *Heteromyrmex* Wheeler, = *Dyomorium* Donisthorpe, = *Dorothea* Donisthorpe), *Xenomyrmex* Forel (= *Myrmecinella* Wheeler), *Liomyrmex* Mayr, *Huberia* Forel, and *Anergates* Forel from consideration in any of his genus-groups. All these exclusions are still considered to be correct and in part are supported by Kugler's (1978) findings relating to the sting structure in some of these genera. Further work on these disposals has shown that *Anergates* is a tetramoriine (Bolton, 1976), *Huberia* appears to be a member of the *Myrmica*-group of genera, and the other names form a genus-group of their own, the *Vollenhovia*-group.

Modifications to Ettershank's system published since its appearance in 1966 include the synonymy of *Brownidris* with *Ochetomyrmex* Mayr by Kempf (1975), the splitting of *Nothidris* in the sense of Ettershank (1966) into two discrete genera, *Nothidris* plus *Antichthonidris*, by Snelling (1975), and the removal of *Hagioxenus* as a junior synonym of the tetramoriine genus *Rhoptromyrmex* Mayr by Bolton (1986*a*).

Concerning the three genus-groups devised by Ettershank from the old tribe Solenopsidini, Kempf (1974) expressed concern that they were 'too loosely defined, most of the diagnostic characters not being sufficiently exclusive.' This was brought about by his discovery of the first male of an *Oxyepoecus* species, which had affinity with *Megalomyrmex* rather than with *Solenopsis*, to which group it was supposed to belong.

The present study implies that the three genus-groups of Ettershank are best recombined into a single unit, the *Solenopsis*-group, but with the exclusion of the genera *Tranopelta* and *Ochetomyrmex* (= *Brownidris*). When establishing the latter genus-level synonym Kempf (1975) suggested that *Ochetomyrmex* be transferred into the solenopsidine tribal complex. However, both of these genera lack the median clypeal seta in all castes and the workers and females have the petiolar spiracle situated in front of the midlength of the peduncle. This combination of characters, taken together with Kugler's (1978) sting characters indicating that *Tranopelta* lies some distance from *Solenopsis*, *Monomorium* and their allies, seem to me sufficient to exclude *Tranopelta* and *Ochetomyrmex* from the *Solenopsis*-group as defined below.

Other characters shared by these two genera include, in the worker, large well-developed metapleural glands, broad clypeus which is not bicarinate, postpetiole broadly attached to the gaster and with a sharp anteroventral process, antennae 11-segmented with a club of 3 segments, PF 3, 2 (4, 3 in one *Tranopelta* species). Apart from this *Ochetomyrmex* species tend to have weakly developed frontal carinae present and the type-species (*O. semipolitus* Mayr) has a fine sharp median clypeal carina. Females and males, though less well known, are also very similar and have the postpetiole extremely broadly attached to the gaster. Differences separating *Tranopelta* and *Ochetomyrmex* are documented in Kempf (1975).

With the exclusion of the genera discussed above the remainder of Ettershank's (1966) three groups appears more uniform, linked by the characters given in the diagnosis and definition below. As Kempf (1974) indicated, Ettershank's characters used to delineate his groups were not concise enough, and too many were either inapplicable or overlapped their supposed group boundaries. If the diagnoses given for these groups are superimposed and characters or combinations of characters common to all three are set aside (e.g. antennal and club segmentation, palp segmentation, structure of clypeus, venation, pedunculate petiole), then only the following remain.

Monomorium-group. The anterior tentorial pit is located close to the antennal socket and 4 malpighian tubules are present.

Megalomyrmex-group. The anterior tentorial pit is located about half way between the antennal socket and the lateral margin.

Solenopsis-group. The anterior tentorial pit is located close to the antennal socket and the maxillary palp is geniculate.

The number of malpighian tubules may eventually prove to be a useful character in the taxonomy of this group but at present far too little information is available to make any sweeping pronouncements. Ettershank (1966) gives counts of 4 tubules in *Monomorium* (= *Chelaner*) and

in *Solenopsis*, and 5 in *Megalomyrmex*, but in the last the count is based on only a couple of species. Tubule counts otherwise remain unknown and it is possible that a count of 5 may be diagnostic of *Megalomyrmex* alone within the group as presently defined.

The position of the anterior tentorial pit relative to the antennal socket is inconsistent in the *Megalomyrmex*-group as defined by Ettershank, being no further from the socket in *Nothidris* than in many Australian *Monomorium* from the groups which formerly constituted *Chelaner*. In both the *Solenopsis*- and *Monomorium*-groups the anterior tentorial pit also shows notable variation in position. Kempf (1974) observed that the pits were closer to the sockets in *Solenopsis* then in *Oxyepoecus* and the present survey has shown that in *Anillomyrma* and some groups of *Monomorium* (*fossulatum*-group, *hanneli*-group) the anterior tentorial pit is as far or even farther from the antennal socket than in *Megalomyrmex* and its supposed allies. It is interesting to note that in *Oxyepoecus*, *Anillomyrma* and both *Monomorium* species-groups mentioned, that the frontal lobes and antennal insertions are raised up and closely approximated. I speculate that their migration towards the cephalic midline, whilst the position of the anterior tentorial pits has remained static, has brought them to a position paralleling that exhibited by *Megalomyrmex*. Whether this is the case or not, the use of the pit's position relative to the antennal socket as a group-diagnostic character is compromised to the point of uselessness.

Finally the geniculate maxillary palp, given as a diagnostic character of the *Solenopsis*-group, also occurs in *Carebarella*, which Ettershank none the less places in his *Megalomyrmex*-group.

For these reasons it appears that taxonomic logic is better satisfied for the present if Ettershank's (1966) *Monomorium*-, *Megalomyrmex*-, and *Solenopsis*-groups are reunited into a single larger group, with the exclusion of *Tranopelta* and *Ochetomyrmex*, to be termed the *Solenopsis*-group after its oldest included genus. Changes in genus-level taxonomy from the earlier system may be summarized as follows. Unaffected genera are omitted from the list.

Ettershank (1966)	Present review
Chelaner	Included as synonym of *Monomorium*.
Phacota (synonym of *Monomorium*)	Reinstated as valid genus.
Bondroitia (synonym of *Diplomorium*)	Reinstated as valid genus.
Syllophopsis	Included as synonym of *Monomorium*.
Hagioxenus	Synonymized with *Rhoptromyrmex* by Bolton (1986*a*).
Nothidris	Divided into two genera, *Nothidris* plus *Antichthonidris*, by Snelling (1975).
Tranopelta	Excluded from the group.
Brownidris	Synonymized with *Ochetomyrmex* by Kempf (1975).

The diagnosis and definition presented below seeks to isolate the 13 genera currently recognized as constituting the *Solenopsis*-group from all other ants of the subfamily Myrmicinae. The characters listed in this attempt are as given and discussed, but some other taxonomic aspects, not used here because they are as yet known from far too few taxa to assess their universality or value, must be mentioned.

Kugler (1978, 1979) has carried out detailed examinations of the sting structure of a number of myrmicine genera. These tend to a large extent to support Ettershank's (1966) exclusions from the group, mentioned above, and to support the groupings initiated here. But Kugler's studies have generated their own problems in that genera such as *Calyptomyrmex* Emery, *Rogeria* Emery, and *Wasmannia* Forel appear close to *Solenopsis* and *Monomorium* in sting structure. *Calyptomyrmex* is very different from the *Solenopsis*-group in other aspects of its morphology (Bolton, 1981*a*), and the resemblances in sting mechanism are almost certainly due to convergence. *Rogeria* and *Wasmannia* are less well known. Most probably they also represent convergencies but more material needs to be examined before their relationships can be

accurately ascertained. On the strength of the characters listed below both genera are excluded from the *Solenopsis*-group.

Investigations of venom chemistry carried out by Murray Blum and others indicates that the venoms of *Solenopsis*-group species, as defined here, may provide a useful character in isolating the genus-group. Very few species have been analysed so far, and those which have been examined are restricted to a few species-groups of *Monomorium* and *Solenopsis*. Nevertheless it appears that with the exception of the *Monomorium destructor*-group (Blum *et al.*, 1985) alkaloids constitute a significant fraction in *Solenopsis*-group venoms. Moreover this is the only genus-group of the Myrmicinae where alkaloids have so far been detected. A good synopsis of the current state of knowledge of ant venom chemistry is given by Blum (1985).

Larval characters at present are relatively little known and appear to be very confused and of small value as they now stand. Ettershank (1966) attempted to tabulate the main larval characters as they applied to his concepts, but a later synopsis by Wheeler & Wheeler (1976) does nothing to improve our definition of the group. In fact this last paper maintains the old Emery (1922) classification and a more recent synoptic classification of ant genera by Wheeler & Wheeler (1985) indicates that their idea of a tribe Solenopsidini remains firmly at a pre-Ettershank level. They include many genera now certainly known to have affinities well away from the groups envisaged by Ettershank (1966) or accepted here. Larval characters will probably hold some interesting clues about the generic and suprageneric classification of the Myrmicinae, but until the characters are re-assessed in the light of modern taxonomic opinion they will remain of little use.

The karyology of myrmicine ants is presently little known, very few species having been investigated. For this reason the effects of karyological studies at levels above the species cannot yet be ascertained with any hope of meaningful conclusions being drawn. In *Monomorium* and *Solenopsis* indications are however promising, as surveys to the present seem to indicate that karyotypes may provide an additional character for discrimination at the species-group level (Crozier, 1970; Imai *et al.*, 1984).

Thus the overall effect of recent taxonomic work has been to restrict and condense the *Solenopsis*-group by synonymy of genus-level names originally appearing distinct but rendered untenable because of more recent collections which bridge the supposed gaps between them, by closer definition of the known genera, and by exclusion of genera not certainly related. Whilst it is definitely not claimed that the last taxonomic word on the subject of the *Solenopsis*-group has been spoken, it is hoped that at least some of the outstanding taxonomic inconsistencies have been dealt with.

Measurements and indices

Total Length (TL). The total outstretched length of the ant from the mandibular apex to the gastral apex.

Head Length (HL). The length of the head proper, excluding the mandibles, measured in a straight line from the mid-point of the anterior clypeal margin to the mid-point of the occipital margin, in full-face view, ignoring any projecting teeth which may be present on the clypeus. In species where the occipital margin or the clypeal margin (or both) is concave the measurement is taken from the mid-point of a transverse line spanning the anteriormost or posteriormost projecting points respectively.

Head Width (HW). The maximum width of the head in full-face view, measured behind the eyes.

Cephalic Index (CI). $\dfrac{HW \times 100}{HL}$

Scape Length (SL). The maximum straight line length of the antennal scape excluding the basal constriction or neck close to the condylar bulb.

Scape Index (SI). $\dfrac{SL \times 100}{HW}$

Pronotal Width (PW). The maximum width of the pronotum in dorsal view.

Alitrunk Length (AL). The diagonal length of the alitrunk in profile from the point at which the pronotum meets the cervical shield to the posterior base of the metapleuron.

Depositories

ANIC	Australian National Insect Collection, C.S.I.R.O., Canberra City, Australia.
BMNH	British Museum (Natural History), London, U.K.
CdF	Musée d'Histoire Naturelle, La Chaux-de-Fonds, Switzerland.
EUU	Entomology Department, University of Uppsala, Uppsala, Sweden.
MCSN	Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy.
MCSNV	Museo Civico di Storia Naturale di Verona, Italy.
MCZ	Museum of Comparative Zoology, Cambridge, Mass., U.S.A.
MHN	Muséum d'Histoire Naturelle, Geneva, Switzerland.
MNHN	Muséum National d'Histoire Naturelle, Paris, France.
MNHU	Museum für Naturkunde an der Humboldt-Universität zu Berlin, Germany (D.D.R.).
MRAC	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
NMB	Naturhistorisches Museum, Basel, Switzerland.
NMV	Naturhistorisches Museum, Vienna, Austria.
SAM	South African Museum, Cape Town, South Africa.
UM	University Museum, Oxford, U.K.

The *SOLENOPSIS*-group

DIAGNOSIS. Myrmicine ants with the following combination of characters.
(1) Masticatory margin of mandible with 5 or fewer teeth (one species-group forming a derived exception, see definition below).
(2) Median clypeal seta present, clearly differentiated and conspicuous (secondarily lacking only in some *Solenopsis* males).
(3) Clypeus lacking a median longitudinal ridge or carina.
(4) Lateral portions of clypeus not modified into raised ridges or prominent plates.
(5) Frontal lobes not extending posteriorly as frontal carinae.
(6) Antennal scrobes absent.
(7) Antennae in worker and female never 12-segmented with a 2-segmented club.
(8) Tibial spurs of middle and hind legs not pectinate.
(9) Metapleural lobes (=inferior propodeal plates) never elongate triangular and never acute.
(10) Petiole pedunculate anteriorly and with a distinct node; peduncle never with an enormously developed anteroventral process.
(11) Petiolar spiracle in worker and female not in front of midlength of the peduncle.
(12) Cross-vein *r-m* absent from forewing (except in a few *Solenopsis* males).
(13) Radial (=marginal) cell of forewing open distally.

DEFINITION. *Workers and females*. Myrmicine ants with PF 5, 3 or less. PF 2, 2 is predominant; maxillary palp with 5 segments only in two Malagasy *Monomorium*, maxillary palp 4-segmented only in *Nothidris* and the *Megalomyrmex goeldii*-group, fewer everywhere else. Masticatory margin of mandible with 5 or fewer teeth (usually 4), apical tooth the largest, the remainder decreasing in size towards the base. (Mandibles with only apical tooth in inquiline female of *Monomorium hospitum* Viehmeyer; teeth reduced to two in inquiline females of *M. inquilinum* DuBois, *M. talbotae* DuBois and *Antichthonidris bidentata* (Mayr). In the *Megalomyrmex modestus*-group usually the proximal portion of the mandible showing a proliferation of minute denticles between or instead of the main teeth.) Median clypeal seta present, usually long and conspicuous. Clypeus lacking a median longitudinal ridge or carina; median portion of clypeus frequently bicarinate but always lacking multiple longitudinal rugae or carinae. Lateral portions of clypeus not forming a raised rim or shield wall in front of the antennal insertions, nor reduced to prominent anteriorly projecting plates. Frontal carinae absent behind level of frontal lobes and antennal scrobes never developed. Frontal lobes small and narrow, usually only partially concealing the antennal insertions in full-face view (in workers, rarely larger in females). Antennae with 7–12 segments but if 12 then the apical club is never of 2 segments. Sculpture of head fine and dense to absent, never of coarse rugosity, never reticulate-rugose. Promesonotum unarmed in workers, lacking teeth, spines or tubercles; pronotum and mesonotum unarmed in females. Mesothoracic spiracles not opening onto dorsal alitrunk. Propodeum

almost universally unarmed, sometimes (*Oxyepoecus*, *Nothidris*, some *Monomorium*) sharply angulate or with projecting subtriangular lamellae or denticles; distinct propodeal spines are present only in *Antichthonidris bidentata*, a few aberrant Australian *Monomorium*, workers of *Allomerus vogeli* Kempf, and one or two apterous females of *Monomorium salomonis*-group. Propodeal spiracle at or close to the propodeal midlength, not shifted posteroventrally except in a very few Australian *Monomorium*; the spiracle grossly enlarged in *Bondroitia*. Metasternal process vestigial to absent; ventral alitrunk lacking an elongate △-shaped cleft running from the posterior margin between the hind coxae. Metapleural lobes variously shaped but usually small and rounded, sometimes reduced to vestigial lamellar strips but never elongate-triangular with an acute apex. Hind tibiae with spurs simple to absent, not pectinate. Forewing (alate female) with radial cell open,vein *Rs* not curving towards the leading edge of the wing to fuse with the marginal abscissa of *R* distal of the pterostigma. Forewing with cross-vein *r-m* absent. Petiole pedunculate and with a differentiated unarmed node which in workers is usually subconical in profile, but sometimes otherwise. Subpetiolar process small to absent; petiole and postpetiole lacking spongiform appendages. Petiolar spiracle at or (usually) behind the midlength of the peduncle, not close to the articulation of peduncle with alitrunk. Promesonotum (workers) with sculpture fine and dense to absent; propodeum similar or with stronger sculpture than the foregoing. Alitrunk never adorned with multiple peaks or tubercles. Pilosity simple when present.

Males. As above but with the following modifications.

Masticatory margin of mandibles often as above but frequently with only two teeth. In *Carebarella* the mandibles are atrophied and in some groups of *Monomorium* and elsewhere the male mandible has fewer teeth than the conspecific worker or female, sometimes only the apical tooth is developed. Median portion of clypeus not longitudinally bicarinate. Median clypeal seta usually conspicuous but variously developed in *Solenopsis* and sometimes absent. Frontal lobes minute to absent, never covering the antennal insertions. Antennae with 12 or 13 segments, not clavate apically. First funicular segment frequently reduced, sometimes globular; funiculus basally lacking elongate fusion segments. Mesoscutum generally lacking notauli, present only in some Australian *Monomorium* and in the South American *Antichthonidris*. Mesoscutellum unarmed posteriorly. Propodeum unarmed and not grossly reduced with respect to the mesothorax. Propodeal spiracle in front of midlength of side. Node of petiole often reduced and more rounded than in worker or female. Venation characters as in alate female but very rarely *Solenopsis* males may be found in which cross-vein *r-m* is still visible. Sculpture varying from dense and quite coarse to absent, frequently the male more strongly sculptured than the conspecific female or worker.

The diagnosis above is an attempt to separate all 13 genera of the *Solenopsis*-group from the rest of the Myrmicinae. Thus any myrmicine species not showing all these characters in combination and failing to conform to the definition is excluded from the group.

It must be admitted that whilst the above characters are reasonable for workers and females their universality in males cannot be assessed in great detail at present as males are known for relatively few species in the genus-group as a whole, and remain unknown or known for only a single species in some genera.

The phylogenetic significance of the characters can be partially assessed. Using the *Myrmica*-group and *Tetramorium*-group as outgroups for comparison, as they reflect most characters currently considered to approximate the ancestral myrmicine condition, the characters enumerated above segregate as follows. Characters (1), (3), (8), (12), and (13) are apomorphic by reduction. The corresponding plesiomorphic states are (1) mandibles serially multidentate; (3) median longitudinal ridge or carina conspicuous on clypeus: (8) tibial spurs pectinate; (12) cross-vein *r-m* present; (13) radial cell closed. Character (2) is apomorphic by development. The plesiomorphic state here is envisaged as a continuous row of undifferentiated clypeal setae, without an obvious median component. Characters (4), (5), and (6) are plesiomorphic as stated but are useful as taxonomic diagnostics, serving to exclude all taxa with modified lateral clypeal structure, frontal carinae, or antennal scrobes.

Structure of the antennae in workers and females, character (7), shows much variation in the *Solenopsis*-group. However, the combination of 12-segmented antennae with a 2-segmented club does not occur and is listed here to exclude the otherwise close genera *Adelomyrmex* Emery and *Baracidris* Bolton. It seems most likely that this antennal structure is an apomorphy peculiar to each of these genera, but it may not be synapomorphic between them. Characters (9), (10), and (11) are difficult to interpret in terms of polarity. In the case of character (10) it seems apparent that a sessile petiole is the ancestral (plesiomorphic) state as it is shown in the ectatommine ponerines, which constitute the sister-group of the entire Myrmicinae. However, the myrmicine groups which correspond most closely to the ectatommines, the *Myrmica*-group and *Tetramorium*-group, show a pedunculate petiole. Evidence is ambiguous but it

must be considered possible that some or all myrmicines which currently show a sessile petiole may in fact be expressing a secondary development from pedunculate ancestral forms rather than a retention of the plesiomorphic sessile condition exhibited by the ectatommines.

Position of the petiolar spiracle, character (11), is usually consistent within narrow limits within genus-groups. Unfortunately polarity of the states is hard to assess as the petiolar peduncle may be developed in more than one way. In the sessile petiole the spiracle is normally at the base of the node's anterior face and close to the articulation with the alitrunk. Where a peduncle is developed it can be envisaged as an elongation of the section in front of the spiracle, or the section behind it, or both. In the first case the spiracle would be 'left behind', remaining close to the node as the peduncle opened a gap between node and anterior articulation. In the second case the developing peduncle would open a gap between the spiracle and the node, leaving the former close to the anterior articulation whilst the node was shifted posteriorly. Both mechanisms acting at once, or a later migration by the spiracle from either of these conjectural original positions, would leave the spiracle in an intermediate position. Obviously more study of both characters (10) and (11) is required throughout the Myrmicinae before any conclusions can be drawn.

Thirteen genera are currently recognised in the *Solenopsis*-group. As a group they show world-wide distribution but the vast majority of species are confined to the tropics and subtropics.

Investigation of the phylogenetic relationships of these 13 genera is in its infancy. At present complexes of genera appear best associated by the following series of characters, displayed by the female and worker castes (males are not well enough known). Polarity of many of these characters remains to be determined.

Anillomyrma + *Bondroitia*: fore coxae greatly enlarged; mandibular apices cross over; eyes absent; subpetiolar process lost; promesonotum uniformly flat. Versus in the remaining 11 genera: fore coxae not enlarged; mandibular apices overlap; eyes present; subpetiolar process present; promesonotum convex at least in part.

Solenopsis + *Oxyepoecus* + *Carebarella*: maxillary palp geniculate (after Ettershank (1966); the universality of this character remains to be investigated in detail). Versus in the remaining 8 genera: maxillary palp not geniculate.

Allomerus + *Diplomorium*: median clypeus broad and shield-like; median clypeus not bicarinate; antennal insertions widely separated; antennal club segments specialized. Versus in the remaining 6 genera: median clypeus relatively narrow; median clypeus bicarinate (some with carinae secondarily partially or totally lost); antennal insertions relatively close together; antennal club segments not specialized.

Epelysidris: basal border of mandible bilobate. Versus in the remaining 5 genera: basal border of mandible unarmed.

Monomorium + *Nothidris* + *Phacota* + *Megalomyrmex* + *Antichthonidris*. It is possible that *Phacota* (see there) represents nothing more than an ergatoid female of the *Monomorium salomonis*-group. I am not sure that *Nothidris* and *Antichthonidris* represent anything more than a southern Neotropical fraction of the Australasian *Monomorium* fauna, and *Megalomyrmex* remains to a large extent insufficiently defined. Much more information on the Australasian and Neotropical faunas will be necessary before any conclusions can be drawn.

Key to *Solenopsis*-group genera (workers)

The key is based on workers as females and males are insufficiently known, or in some genera remain unknown. *Monomorium*, *Allomerus* and *Megalomyrmex*, which show variation in antennal segment count, palp formula, or both, are keyed out in more than one position.

1 Antennae with 7–10 segments 2
— Antennae with 11–12 segments 6
2 Eyes absent. Postpetiole articulated high on the first gastral tergite (Figs 1, 4). (Oriental and Indo-Australian)..... ***ANILLOMYRMA*** (p. 273)
— Eyes present. Postpetiole articulation normal, not high on the first gastral tergite..... 3
3 Antennal club of 2 segments. Maxillary palp geniculate. Antennae always with 10 segments..... 4
— Antennal club of 3 segments. Maxillary palp not geniculate. Antennae with 7–10 segments 5
4 Median portion of clypeus abruptly raised and flat-topped, the raised platform bounded by the parallel paired clypeal carinae which then turn mesad anteriorly and meet anteromedially to form the anterior margin of the raised portion. (Neotropical)..... ***CAREBARELLA*** (p. 286)
— Median portion of clypeus without a raised flat-topped section, instead the two clypeal carinae divergent anteriorly and running to the margin where they often project as a pair of teeth or denticles. Clypeal carinae never turning mesad anteriorly nor meeting anteromedially. (World wide) ..... ***SOLENOPSIS*** (p. 285)

5 Palp formula 3, 2. Median portion of clypeus evenly transversely convex, not longitudinally bicarinate. Antennal club segments each constricted basally. (Neotropical) ***ALLOMERUS*** (part, p. 282)

— Palp formula 2,2 or 1,2. Median portion of clypeus raised and longitudinally bicarinate. Antennal club segments not constricted basally. (Australia) ..... ***MONOMORIUM*** (part, p. 287)

6 Antennae with 11 segments 7

— Antennae with 12 segments 12

7 Eyes absent. Propodeal spiracle enormously enlarged (Figs 2, 5). (Afrotropical) ***BONDROITIA*** (p. 275)

— Eyes present. Propodeal spiracle not enormously enlarged 8

8 Antennal club of 2 segments. Head almost circular in full-face view, the eyes behind the midlength of the sides of the head. (Spain) ..... ***PHACOTA*** (p. 281)

— Antennal club of 3 segments. Head not circular in full-face view, the eyes in front of the midlength of the sides of the head 9

9 Propodeum in profile sharply angulate to bidentate between dorsum and declivity 10

— Propodeum in profile unarmed, the dorsum curving evenly into the declivity 11

10 Median portion of clypeus sharply longitudinally bicarinate, the carinae terminating in a pair of projecting teeth. Mandibles with 4 teeth. PF 2,2. Segments of antennal club not constricted basally. (Neotropical) ..... ***OXYEPOECUS*** (p. 286)

— Median portion of clypeus evenly convex, not longitudinally bicarinate and lacking a pair of projecting teeth. Mandibles with 5 teeth. PF 3,2. Segments of antennal club distinctly constricted basally. (Neotropical) ..... ***ALLOMERUS*** (part, p. 282)

11 Median portion of clypeus distinctly raised, strongly to weakly longitudinally bicarinate. Postpetiole node less voluminous than petiole node in profile and narrowly attached to gaster. (Widespread in Old World) ..... ***MONOMORIUM*** (part, p. 287)

— Median portion of clypeus evenly transversely convex, not distinctly raised nor longitudinally bicarinate. Postpetiole node much more voluminous than petiole node in profile and very broadly attached to gaster (Figs 3, 6). (South Africa) ..... ***DIPLOMORIUM*** (p. 278)

12 Basal border of mandible with two posteriorly directed broad rounded lobes, the first close to the basalmost of the 5 teeth, the second near the trulleum (Fig. 17). (Borneo) ***EPELYSIDRIS*** (p. 279)

— Basal border of mandible without posteriorly directed lobes 13

13 Maxillary palp with 4–5 segments 14

— Maxillary palp with 1–3 segments 16

14 Maxillary palp with 5 segments. (Madagascar) ..... ***MONOMORIUM*** (part, p. 287)

— Maxillary palp with 4 segments. (Neotropical) 15

15 Propodeal declivity with a transversely arched rim or carina running between the uppermost points of the metapleural lobes. Propodeal spiracle not preceded on side of alitrunk by a thin-walled vestibule which is conspicuous through the cuticle. (Neotropical) ***MEGALOMYRMEX*** (part, p. 285)

— Propodeal declivity without an arched rim or carina between the uppermost points of the metapleural lobes. Propodeal spiracle preceded on side of alitrunk by a thin-walled vestibule which is conspicuous through the cuticle. (Chile) ..... ***NOTHIDRIS*** (p. 284)

16 Palp formula 3,2. Mandibular dentition irregular behind the preapical tooth, either with numerous minute denticles or with regular teeth interspersed with minute denticles. (Neotropical) ..... ***MEGALOMYRMEX*** (part, p. 285)

— Palp formula never 3,2; variable but usually 2,2. Either mandibular teeth regularly decreasing in size from apex to base or with basal tooth reduced, not irregular as above and with 3–5 teeth in all 17

17 Mandible with 5 teeth. Palp formula 2,2. Anterior tentorial pit midway between antennal socket and lateral margin of clypeus. Propodeum bidentate to bispinose. (Chile & southern Argentina) ..... ***ANTICHTHONIDRIS*** (p. 283)

— Mandible with 3–5 teeth, usually with 4. If 5 teeth present then either palp formula not 2,2, or anterior tentorial pit close to antennal socket, or propodeum unarmed, or all of these together. (World wide) ..... ***MONOMORIUM*** (part, p. 287)

ANILLOMYRMA Emery

(Figs 1, 4)

Anillomyrma Emery, 1913: 261 [as subgenus of *Monomorium*]. Type-species: *Monomorium decamerum* Emery, 1901: 117; by monotypy.
Anillomyrma Emery; Ettershank, 1966: 97. [Raised to genus.]

WORKER. Minute (TL < 2·0) monomorphic subterranean myrmicine ants. PF 2,1, the labial palpomere composed of two semi-fused segments, the apical half of which is flattened and lobiform so that the labial palp is much larger than the two-segmented subcylindrical maxillary palp. Mandibles with 3–4 teeth, the masticatory margins very oblique and the mandibular apices crossing over at full closure. Trulleum small and closed. Eyes absent. Antennae 10-segmented with a very large 3-segmented apical club. Funicular segments 2–6 reduced to very short broad annuli. Frontal lobes very closely approximated, the posterior portion of the clypeus which passes between them very narrow, narrower than the width of either lobe. Median portion of clypeus narrow and distinctly raised above the level of the lateral portions, the median portion narrowly transversely convex and lacking longitudinal carinae. Promesonotum flat dorsally, the metanotal groove represented by a straight line across the dorsum, not impressed. Fore coxae much enlarged, very much larger than the middle and hind coxae. Propodeal spiracle small, its orifice circular and situated at about the midlength of the sclerite. Petiole with a long anterior peduncle, lacking an anteroventral process. Petiole node long, low and dorsally broadly convex in profile. Postpetiole low and small in profile, in dorsal view very broadly attached to the gaster. In profile the postpetiole articulated high on the first gastral segment. Sting large and strongly sclerotized, disproportionately powerful.

FEMALE and MALE. Unknown.

This distinctive small genus contains only two species and one subspecies, the last probably synonymous with the type-species of the genus. As Wheeler (1927*b*) suggested, *Anillomyrma* is most closely related to *Bondroitia*, sharing characters of mandibular structure, lack of eyes, close approximation of frontal lobes and antennal insertions, very narrow median clypeus which lacks longitudinal carinae, enlarged fore coxae, and conspicuously flattened promesonotal dorsum. Habitus of the two genera is also similar, compare Figs 1, 2, 4, 5. *Anillomyrma* and *Bondroitia* together separate from the remainder of the *Solenopsis*-group by their joint possession of strongly crossing mandibular blades, lack of eyes, flattening of the alitrunk dorsum, lack of clypeal carinae on median portion of clypeus (*Diplomorium* and some Neotropical taxa lack carinae but here the clypeus is broad), very closely approximated frontal lobes (similar in the *Monomorium fossulatum*-group), lack of a subpetiolar process, and enlarging of the fore coxae.

The two genera are separated by the following characters in the worker.

Anillomyrma (Figs 1, 4)	*Bondroitia* (Figs 2, 5)
(1) Antennae 10-segmented.	Antennae 11-segmented.
(2) Palp formula 2,1.	Palp formula 2,2.
(3) Labial palpomere expanded, flattened and lobate.	Labial palpomeres cylindrical to subcylindrical.
(4) Propodeal spiracle small, at about the midlength of the sclerite.	Propodeal spiracle enormous, behind the midlength of the sclerite.
(5) Metanotal groove not impressed on the dorsum.	Metanotal groove impressed on the dorsum.
(6) Metapleural glands conspicuous.	Metapleural glands very small.
(7) Postpetiole attached high on the first gastral segment.	Postpetiole attached to the gaster in normal position.
(8) Postpetiole-gaster articulation very broad.	Postpetiole-gaster articulation narrow.
(9) Sting relatively very large and powerfully developed.	Sting relatively small and feeble.

It is possible that some similarities of *Anillomyrma* and *Bondroitia* are superficial and due to morphological convergence through the similarity of their lifeways. In particular this may apply to their loss of eyes and the flattening of the dorsal alitrunk. However, the form of the mandibles, the narrowing of the median clypeus with close approximation of the frontal lobes, the disappearance of the subpetiolar process and the increase in size of the fore coxae appear to be valid synapomorphies isolating these two genera from the remainder of the genus-group.

Accepting that *Anillomyrma* and *Bondroitia* together form a holophyletic grade within the *Solenopsis*-

group on the strength of the characters just mentioned, then of the nine characters tabulated to separate the two genera those apomorphic in *Anillomyrma* are (1), (2) and (5) by reduction and (3), (7) and (8) by development; whilst those apomorphic in *Bondroitia* are (6) and (9) by reduction and (4) by development, as compared to the remainder of the genus-group.

Very little is known of the biology of this genus. The few samples of *decamera* which are known were taken in soil or litter samples, or from termite nests, the occupants of which may or may not constitute the normal prey of the species. *A. tridens* was discovered in Sarawak crossing a small forest path by means of a covered runway in the topsoil. The runway was very conspicuous where it crossed the path and consisted of a narrow shallow groove in the soil which was covered by a canopy of small soil particles, concealing the ants moving along inside the tube thus formed. On disturbing the soil of the runway large numbers of minute yellowish ants poured out to investigate. Handling these tiny ants proved to be a mistake as they use their stings freely and, though minute, they are capable of penetrating the skin and delivering a painful sting out of all proportion to the size of the ant. The ant runway was revisited a few hours later and workers were still moving along within though no trace of sexuals or brood could be found.

I am unable to say whether this movement represented a nest transfer or whether *A. tridens* is nomadic, but the ant runway was not on the forest path the day before its discovery and was deserted the day after, and shortly after that was washed away by a downpour. The site of the runway was checked periodically for the next couple of weeks but the ants never returned.

Key to species (workers)

1 Mandible with 3 teeth, consisting of a large apical and preapical tooth which are close together, followed by a diastema and a large third (basal) tooth. (East Malaysia: Sarawak) ***tridens***(p. 274)

— Mandible with 4 teeth, consisting of a large apical and preapical tooth which are close together, followed by a diastema and a large third tooth, basal to which is a distinctly smaller fourth tooth. (Sri Lanka, India, Vietnam) ..... ***decamera***(p. 274)

Anillomyrma decamera (Emery)

Monomorium decamerum Emery, 1901: 117. Syntype workers, Sri Lanka: Anuradhapura, in Termitennestern, 1899 (*W. Horn*) (MCSN) [not seen].
Monomorium (Anillomyrma) decamerum Emery; Emery, 1913: 261.
Anillomyrma decamera (Emery); Ettershank, 1966: 98.

A. decamera is characterized within the genus, and separated from *tridens*, by its 4-dentate mandibles. Wheeler (1927*b*) described a subspecies *continentis* from Van Phu (? Vietnam), but from the description this seems indistinguishable from Indian specimens of *decamera* deposited in BMNH. I suspect that further investigation will show *continentis* to be a synonym of *decamera*.

Material examined

India: Bihar, Ranchi Dist., Ormanjai (*P. B. Sinha*).

Anillomyrma tridens sp. n.

(Figs 1, 4)

Holotype worker. TL 1·8, HL 0·38, HW 0·34, CI 89, SL 0·22, SI 58, PW 0·24, AL 0·38.

With habitus as in Figs 1, 4, and with characters of generic diagnosis. Mandibles with three large sharp teeth, which are darker in colour than the remainder of the body. Apical and preapical teeth close together, separated by a diastema from the third (basal) tooth, the third tooth shallowly curved towards the apex of the mandible. Antennal scapes short (SI 60 or less), slightly shorter than the funiculus which measures *ca* 0·36 in the holotype. Of the funicular segments the first is *ca* 0·06, the annular segments 2–6 measure only 0·06 together, and the relatively large club is 0·24 (the club is longer than the scape). Pronotal humeri very broadly rounded in dorsal view, the dorsal alitrunk pinched in at the metanotal line. Petiole node longer than broad in dorsal view, the postpetiole slightly broader than long. All dorsal surfaces of head and body with abundant short soft fine standing hairs; the legs, scapes and sides of head with similar hairs which project freely. Sculpture absent except for hair-pits, which are most conspicuous on the head and pronotum. Colour very pale yellowish white, extensively depigmented.

Paratype workers. TL 1·8–1·9, HL 0·37–0·39, HW 0·33–0·36, CI 88–90, SL 0·21–0.23, SI 57–60, PW 0·24–0.25, AL 0·35–0·39 (10 measured). As holotype.

Holotype worker, **East Malaysia**: Sarawak, 4th. Division, Gunong Mulu Nat. Park, RGS Expd., Long Pala, 11.x.1977, lowland rain forest in sandy soil (*B. Bolton*) (BMNH).

Paratypes. 39 mounted workers plus many more in alcohol, with same data as holotype (BMNH; MCZ; MHN; NMB).

BONDROITIA Forel **gen. rev., stat. n.**

(Figs 2, 5, 7–11)

Bondroitia Forel, 1911*a*: 300 [as subgenus of *Monomorium*]. Type-species: *Monomorium (Martia) coecum* Forel, 1911*a*: 299 (= *Diplomorium lujae* Forel, 1909: 72); by monotypy.
Bondroitia Forel; Ettershank, 1966: 98 [as synonym of *Diplomorium*].

Note. The first appearance in the literature of the name *Bondroitia* occurs in Forel (1911*a*) where, at the end of his discussion of *Monomorium coecum*, he says, 'Perhaps subsequent knowledge of the female and male would justify the erection of a new subgenus, for which I would then take the liberty of proposing the name *Bondroitia*.' As this conditional statement was made as early as 1911, and as it follows a detailed description of *M. coecum* worker, the name *Bondroitia* is available under the articles of the *International Code of Zoological Nomenclature*, from the date of that publication. Thus the first valid publication of the name *Bondroitia* is Forel (1911*a*: 300), with the type-species *Monomorium coecum* Forel, by monotypy. The slightly later description of *Bondroitia* as a subgenus of *Diplomorium*, by Forel (1911*b*: 398, with *D. lujae* given as type-species), where *Bondroitia* was referred to as a 'new subgenus', is invalid and should be discarded.

Worker. Monomorphic myrmicine ants with noticable size-variation in any series but not exhibiting allometric variation (Figs 2, 5). PF 2,2, the palpomeres subcylindrical (*lujae*). Mandibles with 4 teeth arranged on a markedly oblique masticatory margin, the blades crossing over at full closure. Trulleum small and closed. Eyes absent. Antennae 11-segmented with a 3-segmented apical club. Frontal lobes closely approximated, the posterior portion of the clypeus where it passes between them narrow, only about as wide as one of the frontal lobes or slightly narrower. Median portion of clypeus narrowly transversely convex posteriorly, shallowly concave anteriorly, especially in larger workers. Clypeus without longitudinal carinae. Promesonotum flat dorsally. Metanotal groove impressed on dorsal alitrunk. Metapleural glands small and inconspicuous. Fore coxae enormously enlarged by comparison to mid and hind coxae. Propodeal spiracle enormous, very close to margin of declivity and low on the side, its orifice circular and behind the midlength of the sclerite. Petiole nodiform in profile, the anterior peduncle lacking a ventral process. Postpetiole small, conspicuously less voluminous than the petiole in profile. Postpetiole in dorsal and lateral view narrowly attached to gaster, not articulating high on the first gastral segment. Sting small and inconspicuous. (Diagnosis based on *lujae*, worker of *saharensis* is unknown).

Female. Enormously larger than conspecific worker, head relatively very small in comparison to body size. PF 2,2 (*lujae*, *saharensis*). Mandible with 3 teeth, the blade narrow and with a markedly oblique masticatory margin (Fig. 7). Anterior clypeal margin unarmed, evenly shallowly convex and not overhanging the mandibles. Median portion of clypeus evenly transversely convex, not raised nor bicarinate. Clypeus posteriorly broadly inserted between frontal lobes, the outer margins of the latter constricted behind, with a pinched-in appearance behind the lobes themselves. Eyes large and close to midlength of sides of head. Antennae 11-segmented, the club weakly 4-segmented, not strongly defined but rather the antennomeres gradually increasing in size apically. Mesothoracic axillae small, subtriangular and widely separated on the dorsum (Fig. 9). Mesoscutum and scutellum fitting tightly together, not separated by a broad impression. Metapleural glands small and inconspicuous. Venation of forewing as Fig. 11, with cross-vein *m-cu* present. Peduncle of petiole lacking an anteroventral process. In profile the postpetiolar sternite a very small sclerite. In dorsal view the postpetiole subglobular and only narrowly attached to the gaster.

Male. Enormously larger than the conspecific worker but smaller than the female. Head very small by comparison with remainder of body (Fig. 10). Mandibles bidentate. PF 2,2 (*lujae*, *saharensis*). Antennae with 12 segments (*lujae*) or 13 segments (*saharensis*), if 12 then the apical is an elongate fusion-segment. First funicular segment globular, only about half the length of either the scape or the second funicular segment. Funiculus from segment 2 to apex gradually tapering, not whip-like. Eyes large, at about the midlength (*lujae*) or extended anteriorly and reaching the clypeus (*saharensis*). Head not strongly produced backwards behind the eyes. Notauli absent. Parapsidal grooves present but faint. Axillae small

and widely separated. Mesoscutum and scutellum separated only by a narrow slit between the axillae, without a broad impressed groove. Propodeal spiracle very large and circular. Venation as in female. Peduncle of petiole without an anteroventral process. Postpetiolar sternite small in profile, the tergite large and very broadly attached to the gaster.

Ettershank (1966) treated *Bondroitia* as a synonym of *Diplomorium* where previously it had been usual to regard it as a subgenus, following Emery (1922). Only rarely was *Bondroitia* regarded as a valid genus (Wheeler, 1922) but the present analysis concludes that *Bondroitia* must stand as a genus apart from *Diplomorium*. As presently constructed the genus contains only two species, *lujae* and *saharensis*. For other disposals from *Diplomorium* in the sense of Ettershank (1966), see under *Diplomorium*.

Workers and females of the two genera separate on the following suite of characters; the male of *Diplomorium* remains unknown.

Diplomorium

Workers (Figs 3, 6)

Masticatory margin of mandible not markedly oblique; blades overlap but do not cross over at full closure.

Clypeus very broad between frontal lobes, antennal insertions widely separated (width across frontal lobes at maximum separation = 0.48 times width of head at that level).

Extreme lateral portion of clypeus not dentate over outer border of mandible.

Eyes present.

First segment of antennal club (funiculus segment 8) very much smaller than second club segment (funiculus segment 9).

Promesonotum convex.

Fore coxae not much larger than the middle and hind coxae.

Propodeal spiracle small, situated approximately at midlength of propodeal side.

Metapleural glands large.

Peduncle of petiole with an anteroventral process.

Females (Figs 12–15).

Mandibles with 4–5 teeth.

Anterior clypeal margin projecting as a broad triangle medially, extensively overhanging the mandibles.

Frontal lobes evenly convex, not pinched in posteriorly behind the antennal insertions.

Antennae with a strongly defined 3-segmented club.

Axillae joined across mesothoracic dorsum by a broad shallow groove which separates the mesoscutum and scutellum.

Metapleural glands large.

Peduncle of petiole with a conspicuous anteroventral process.

Postpetiolar sternite large in profile.

Postpetiole in dorsal view transverse and very broadly attached to the gaster.

Bondroitia

Workers (Figs 2, 5)

Masticatory margin of mandible markedly oblique; blades crossing over at full closure.

Clypeus very narrow between frontal lobes, antennal insertions closely approximated (width across frontal lobes at maximum separation = 0·30 times width of head at that level).

Extreme lateral portion of clypeus projecting as a low broad triangular tooth over outer basal border of mandible.

Eyes absent.

First segment of antennal club (funiculus segment 8) subequal in size to second club segment (funiculus segment 9).

Promesonotum flat.

Fore coxae enormously enlarged when compared to the middle and hind coxae.

Propodeal spiracle enormous, situated at posterior margin of propodeal side.

Metapleural glands small.

Peduncle of petiole lacking an anteroventral process.

Females (Figs 7–11).

Mandibles with 3 teeth.

Anterior clypeal margin evenly convex, not overhanging the mandibles.

Frontal lobes convex anteriorly, concave posteriorly, pinched in behind the antennal insertions.

Antennae with a weakly defined 4-segmented club.

Axillae joined across mesothoracic dorsum by a narrow incised line, the mesoscutum and scutellum fitting tightly together.

Metapleural glands small.

Peduncle of petiole without an anteroventral process.

Postpetiolar sternite small in profile.

Postpetiole in dorsal view subglobular and only narrowly attached to the gaster.

The real affinities of *Bondroitia* appear to lie with *Anillomyrma*. Five apparently good synapomorphies link the workers of the two genera and exclude *Diplomorium* and other members of the genus-group.
The mandibular apices cross over at full closure.
Median portion of clypeus is much narrowed posteriorly so that the antennal insertions are closely approximated. (The mechanism for this may be the approximation of the antennal insertions causing the narrowing of the clypeus, rather than vice versa.)
Bicarinate nature of the clypeus is secondarily lost.
Anterior pair of coxae are much enlarged.
Subpetiolar process is lost from the peduncle.

Other characters, possibly also synapomorphies but just possibly acquired convergently, include loss of eyes and flattening of the promesonotum. A list of apomorphic characters separating *Anillomyrma* and *Bondroitia* is given under the former name. The present analysis leads to the conclusion that the characters which have been used in the past to link *Bondroitia* to *Diplomorium* are either plesiomorphic or the result of convergence. This includes, in both workers and females, the low PF and dental count, the lack of a bicarinate clypeus (I suspect that whilst *Bondroitia* has certainly lost the carinae *Diplomorium* may never have had them), the 11-segmented antennae (where differences in formation of the club imply different developmental routes); and in females alone the venation and relative width of the clypeus between the frontal lobes.
The two species included in *Bondroitia* are as follows.

Bondroitia lujae (Forel) **comb. n.**

(Figs 2, 5, 7–11)

Diplomorium lujae Forel, 1909: 72. Syntype workers, females, males, ZAIRE: Kasai, Sankura (*E. Luja*) (MHN) [examined].
Monomorium (Martia) coecum Forel, 1911*a*: 299. Holotype worker, SWITZERLAND: Geneva (locality in error) (MHN) [examined]. **Syn. n.**

Characters given by Forel (1911*b*: 397) for separating *lujae* and *coecum* have no foundation in reality. The mandible of *coecum* has 4 teeth, not 3 as stated, and the very minor differences otherwise noted are part of the normal variation of *lujae*, as indicated by a long series examined from Angola (in BMNH). As for the anomalous type-locality ascribed to *coecum*, it seems most likely that the single worker had been inadvertently left behind in the vial which originally contained the *lujae* type-series. This vial was later used to hold some Swiss ants and, when they were decanted, the remaining *Bondroitia* worker had come out with them, giving the spurious impression that it had originated in Switzerland along with the genuine Swiss ants currently occupying the vial (see Forel, 1909; 1911*a*; 1911*b*).

All castes of *lujae* are known but the worker of *saharensis* remains to be discovered. Differences separating the males and females of the two are given below.

MATERIAL EXAMINED
Zaire: Kasai, Sankura (*E. Luja*). **Angola**: Mt Moko (*M. C. Day*).

Bondroitia saharensis (Santschi) **comb. n.**

Diplomorium saharensis Santschi, 1923: 278. Syntype females, male, NIGER: Bilma, ix-xi.1913 (*Noel*) (MNHN) [examined].

This species, known only from two females and a single male, is close to *lujae*. The female is much smaller than that of *lujae*; HW 1·94 in *lujae*, HW 1·18 in *saharensis*; maximum width of mesoscutum 2·72 in *lujae*, 1·56 in *saharensis*. The female of *saharensis* is yellow in colour, as opposed to black in *lujae*, and if the size discrepancy between *lujae* female and worker is expressed in *saharensis* then workers of the latter will be very small indeed. Eyes of the *saharensis* female are relatively larger than those of *lujae*, 0·44 × HW in the former and 0·24 × HW in the latter.

Males show the differences in antennal segment count and eye position mentioned in the diagnosis of the genus, rendering them easy to differentiate.

MATERIAL EXAMINED
NIGER: Bilma (*Noel*).

DIPLOMORIUM Mayr

(Figs 3, 6, 12–15)

Diplomorium Mayr, 1901: 16. Type-species: *Diplomorium longipenne* Mayr, 1901: 18; by monotypy.

WORKER. Monomorphic myrmicine ants with some size variation but lacking allometric variation. Palp formula 2,2. Mandibles usually with 4 teeth but 5 may be present in largest workers; mandibles overlap at full closure but do not cross over. Trulleum small and closed. Eyes present and conspicuous, in front of the midlength of the sides in full-face view. Median portion of clypeus not suddenly raised, instead swollen and evenly broadly transversely convex, lacking longitudinal carinae (Fig. 3). Posteriorly the median portion of the clypeus broad and broadly inserted between the widely separated frontal lobes, the clypeus between the lobes broader than either of them. Antennae 11-segmented, with a weakly 3-segmented club. The basal club segment (eighth funicular) much smaller than the other two but still distinctly larger than the seventh funicular segment. Promesonotum convex, not flat. Metanotal groove impressed. Metapleural glands large and distinct. Propodeal spiracle small and round, situated low on the side, at about the midlength of the sclerite or just behind the midlength. Petiole nodiform, subpetiolar process present as a narrow cuticular strip. Postpetiole enlarged, in profile more voluminous than the petiole (Fig. 6), in dorsal view very broadly attached to the gaster. Sting strong and obviously functional.

FEMALE. Enormously larger than the conspecific worker, head relatively small in comparison to body size (HW 1·54, maximum width of mesoscutum 2·02). Palp formula 2,2. Mandible with 4 teeth, sometimes an additional denticle between teeth 2 and 3. Anterior clypeal margin unarmed,triangular and projecting as a point medially, overhanging the mandibles (Fig. 14). Median portion of clypeus evenly curved and transversely convex, not suddenly raised medially and lacking longitudinal carinae. Clypeus posteriorly broadly inserted between the frontal lobes, the outer margins of the latter evenly shallowly convex, not pinched in posteriorly. Eyes large and close to midlength of sides. Antennae 11-segmented, with an apical club of 3 segments. Mesothoracic axillae large, subtriangular, widely separated on dorsum. Mesoscutum and scutellum separated by a broad impression between the axillae (Fig. 15). Metapleural glands conspicuous, the orifice with a short row of guard hairs. Propodeal spiracle D-shaped. Venation of forewing as Fig. 12, cross-vein *m-cu* present. Petiole and postpetiole shaped as Fig. 13, the petiolar peduncle with a conspicuous anteroventral process. Postpetiolar sernite large and distinctive in profile. In dorsal view postpetiole much broader behind than in front and broadly attached to the gaster.

MALE. Unknown.

In his review of the genera related to *Monomorium*, Ettershank (1966) decided that *Diplomorium* and *Bondroitia* were congeneric, based on a comparison of the workers and females of *longipenne* and *lujae*. The present analysis reverses that decision and treats the two as separate small genera, based upon the diagnoses presented above and under *Bondroitia*, and on the detailed table of differences in worker and female also listed under *Bondroitia*.

In the past a number of *Monomorium* species which have 11-segmented antennae have been misidentified as *Diplomorium*. The following table gives characters which separate the two genera.

Diplomorium	*Monomorium*
Workers	Workers
Median portion of clypeus swollen and evenly transversely convex.	Median portion of clypeus suddenly raised, not evenly transversely convex.
Median portion of clypeus lacking longitudinal carinae (Fig. 3)	Median portion of clypeus longitudinally bicarinate, usually distinctly so but sometimes the carinae reduced.
Postpetiole in profile enlarged, more voluminous than petiole (Fig. 6).	Postpetiole in profile moderate, usually smaller than petiole, sometimes about same size.
Postpetiole very broadly attached to gaster.	Postpetiole narrowly attached to gaster.
Females. As above and also with the following.	
Anterior clypeal margin triangular, coming to a point medially (Fig. 14).	Anterior clypeal margin not triangular, not coming to a point medially.
Propodeal spiracle D-shaped (Fig. 13).	Propodeal spiracle usually round, rarely otherwise.

Of the names include by Ettershank (1966: 100) under *Diplomorium* only the type-species is retained in the genus. The remaining names are dispersed as follows.

D. coecum: to *Bondroitia* as a junior synonym of *lujae*.

D. cotterelli: to *Monomorium* as a junior synonym of *rosae*, a common West African species with 11-segmented antennae.

D. lujae: to *Bondroitia*.

D. saharensis: to *Bondroitia*.

Thus the sole remaining species in the genus is as follows.

Diplomorium longipenne Mayr

(Figs 3, 6, 12–15)

Diplomorium longipenne Mayr, 1901: 18. Syntype workers, females, SOUTH AFRICA: Cape Prov., Port Elizabeth (*H. Brauns*) (NMV; BMNH) [examined].

Nothing is known of the biology of this species except that it nests under stones in the ground and has been found with *Messor capensis* (Mayr). It is not known if this represents some sort of relationship between the two species or if they were merely nesting in the same site.

EPELYSIDRIS **gen. n.**

(Figs 16, 17)

Type-species: *Epelysidris brocha* sp. n.

WORKER. Monomorphic myrmicine ants. Palp formula 3.2. Mandibles elongate-triangular, the masticatory margin with 5 sharp teeth which scarcely decrease in size from preapical to basal; preapical to basal teeth separated by diastemata. Basal border of mandible equipped with two broad-based bluntly triangular lobes, the first close to the basalmost sharp tooth and the second near the trulleum. Trulleum large, deformed-triangular in shape and narrowly open below base of second lobe on mandibular basal margin. Anterior clypeal margin with a pair of stout triangular teeth. Median clypeal seta present. Anterior tentorial pits about half way between antennal sockets and lateral margins of head. Median portion of clypeus narrow and conspicuously raised, the convex raised section feebly bicarinate posteriorly and the carinae tending to fade out anteriorly. Antennal insertions close together, the width of the posterior portion of the clypeus where it passes between the frontal lobes approximately equal to the width of one of the frontal lobes. Antennae 12-segmented with a strongly differentiated club of 3 segments. Frontal carinae and antennal scrobes absent. Eyes present, small, situated at the midlength of the sides. Promesonotum strongly convex, without dorsal sutures. Metanotal groove present and impressed. Propodeal spiracle large and circular, close to the midlength of the sclerite. Metapleural glands of moderate size, not hypertrophied. Propodeum unarmed but a narrow longitudinal cuticular rim or crest present where dorsum meets declivity, the crest continued down each side of the declivity to the small rounded metapleural lobes. Declivity without a transverse carina linking the dorsalmost points of the metapleural lobes. Petiole with a long anterior peduncle which is subtended by a narrow elongate ventral processes. Petiolar spiracle at the node. Nodes of both petiole and postpetiole strongly developed, shaped as in Fig. 16. Sting long and strong, somewhat flattened and subspatulate apically.

FEMALE and MALE. Unknown.

Epelysidris is easily diagnosed among members of the *Solenopsis*-group by the remarkable pair of lobes on the basal border of each mandible, unknown in any other genus of the group. The structure of the mandibles and clypeus together, combined with the 3,2 palp formula, isolates *Epelysidris* from all other myrmicine ant genera.

Epelysidris appears at first glance to have affinities with the Neotropical genus *Megalomyrmex* as it parallels to some extent the habitus of certain species in the *M. modestus*-group. This impression tends to be reinforced by the fact that the anterior tentorial pits are about half way between the antennal sockets and the lateral margins of the head in *Epelysidris*, a condition thought by Ettershank (1966) to be diagnostic of *Megalomyrmex* and its allies and not to occur in *Monomorium* and its immediate relatives. It is now strongly suspected that the position of the anterior tentorial pit may depend to a large extent on the degree of approximation of the antennal sockets in *Monomorium* and its relatives. Thus in forms where the

posteromedian portion of the clypeus is strongly raised and narrow the antennal sockets are very close together and have apparently migrated towards the midline away from the anterior tentorial pits, leaving the latter in a *Megalomyrmex*-like position rather than close to the sockets as in most *Monomorium*. Analysis of apomorphic characters of *Epelysidris* and the *Megalomyrmex modestus*-group shows that the two have most probably acquired their habitus similarities convergently.

Characters regarded as apomorphic in the *M. modestus*-group include the specialization of the mandibular masticatory margin by the development of multiple denticles, and the presence of a transverse rim or carina across the apices of the metapleural lobes. *Epelysidris* is plesiomorphic in both these cases, with 5 ordinary teeth on the masticatory margin of the madible and lacking the transverse rim between the metapleural lobes.

Conversely characters regarded as apomorphic in *Epelysidris* include the development of lobes on the mandibular basal margin, the presence of large triangular teeth on the anterior clypeal margin, and the development of narrow cuticular crests down each side of the propodeal declivity. The *M. modestus*-group is plesiomorphic in these, with unarmed basal mandibular margins, lacking clypeal teeth, and lacking cuticular crests on the propodeal declivity.

The real affinities of *Epelysidris* appear to lie with *Monomorium* and its immediate allies, from which it has evolved by gross modification and specialization of the mandibles and clypeus. Differences in the mandible between *Epelysidris* and those *Monomorium* species with 5 teeth include lengthening and narrowing of the blade in the former and the opening of diastemata between the teeth following the preapical, and the autapomorphic development of lobes on the basal border. In the case of the clypeus *Epelysidris* has modified the median portion by narrowing and raising it up very markedly, and narrowing its posterior section between the antennal insertions. The pair of longitudinal clypeal carinae, characteristic of *Monomorium*, is very reduced and fades out anteriorly in *Epelysidris*. On the other hand the pair of teeth on the anterior clypeal margin, which mark the apices of the clypeal carinae in many *Monomorium* species, are very much enlarged in *Epelysidris* and are divorced from the carinae altogether.

The single species currently recognized in the genus is as follows.

Epelysidris brocha sp. n.

(Figs 16, 17)

Holotype worker. TL 3·8, HL 0·78, HW 0·64, CI 82, SL 0·83, SI 130, PW 0·46, AL 1·02.

Apical and preapical of the 5 mandibular teeth not separated by a diastema, but with a diastema between each of the remaining teeth. All teeth narrowly triangular and sharp. First lobe on basal margin of mandible more broadly triangular than the basal tooth and conspicuously more bluntly rounded, close to the basalmost tooth of the masticatory margin but directed posteriorly when the mandibles closed. Second lobe confluent with first basally, slightly lower and more broadly triangular than the first lobe. Blades of mandibles unsculptured except for small hair-pits. Mandibles downcurved, rather more strongly so at apex so that in full-face view the apical tooth appears to be directly below the preapical. PF 3,2. Anterior clypeal margin with a slightly prominent median section which is bounded by a pair of sharp triangular teeth; the margin between the teeth more or less transverse. Median clypeal seta conspicuous. Median portion of clypeus narrow and suddenly raised, evenly convex anteriorly but posteriorly with vestiges of a pair of clypeal carinae which converge posteriorly. Space between these carinal vestiges flat to very shallowly transversely concave. Posteromedian section of clypeus very narrow where it passes between the small frontal lobes; the latter not wholly concealing the condylar bulbs of the scapes. Antennal scapes long (SI > 125), when laid straight back from their insertions considerably exceeding the occipital margin. Funicular segments 1–8 *ca* 0·48, the club (funicular segments 9–11) *ca* 0·70; club segments relatively narrow but very much longer than any of the preceding funicular segments. Eyes situated at about the midlength of the sides of the head. Eyes small, about 0·13 × HW, consisting of an outer ring of 8 ommatidia surrounding a single central ommatidium. Outline shape of head as in Fig. 17. Shape of alitrunk, petiole and postpetiole as shown in Fig. 16. Metanotal groove broad and conspicuously impressed, traversed by short but distinct cross-ribs. Propodeal spiracle large, with a circular orifice which is directed somewhat posteriorly, not opening flush with the side of the sclerite. Propodeal dorsum and declivity meeting in a blunt angle in profile, the declivity almost vertical and bounded on each side by a very narrow cuticular crest which is continuous with the metapleural lobes below and just reaches onto the dorsum above. Metapleural lobes small and rounded. Anterior peduncle of petiole long and narrow, subtended by a fine strip-like anteroventral process. Petiolar spiracle at the node. Postpetiole about the same size as the petiole node in profile but somewhat more broadly rounded. In dorsal view the petiole node broader than long; postpetiole also broader than long but more nearly subglobular than the petiole and somewhat narrower. All dorsal surfaces of the head and body with elongate simple standing hairs. Antennal scapes and middle

and hind legs with suberect to subdecumbent projecting hairs, the longest of which are equal to or slightly longer than the width of the appendage on which they arise. Head smooth and shining, unsculptured except for scattered hair-pits. Promesonotum as head but the propodeal dorsum with faint shagreening. Mesopleuron finely and densely punctulate-shagreenate and the metapleuron with a few longitudinal rugulae; otherwise sides of alitrunk unsculptured and shining. Petiole and postpetiole nodes and gaster unsculptured except for hair-pits. Peduncle of petiole with fine punctulation dorsolaterally. Colour uniform dull yellow.

PARATYPE WORKERS. TL 3·7–4·0, HL 0·76–0·80, HW 0·62–0·64, CI 80–83, SL 0·78–0·83, SI 126–132, PW 0·44–0·48, AL 0·96–1·02 (7 measured). As holotype but maximum diameter of eye 0·11–0·13 × HW and the eye with 9–12 ommatidia in total. The eye consists of an outer ring of 8–9 ommatidia which encloses 1–3 central ommatidia.

Holotype worker, **East Malaysia**: Sarawak, Mt Dulit, 4000 ft, moss forest, 21.x.1932, Oxford Univ. Expd. B. M. 1933–254. Ants nest in soil under moss and rocks (*B. M. Hobby & A. W. Moore*) (BMNH). Paratypes. 8 workers with same data as holotype (BMNH; MCZ).

PHACOTA Roger **gen. rev.**

Phacota Roger, 1862*a*: 260. Type-species: *Phacota sichelii* Roger, 1862*a*: 262; by monotypy.
Phacota Roger; Ettershank, 1966: 82 [as synonym of *Monomorium*].

WORKER. Head in full-face view almost circular, in profile lenticular. Eyes situated behind the midlength of the sides. Mandibles short and with parallel borders, the apical margin with 4 teeth. Clypeus large and strongly vaulted, its anterior border feebly emarginate medially. Antennae with 11 segments, the club of 2 segments. Scape long and easily surpassing the occipital margin of the head. Mesonotum strongly saddle-shaped. Propodeum unarmed. Petiole short-cylindrical anteriorly, thickened behind, apparently without a strongly differentiated node. Postpetiole nodiform. Gaster much larger than head.

FEMALE and MALE. Unknown.

Based on a single specimen from Malaga, Spain, *sichelii* has been an enigma from the day of its description to the present. The holotype appears to have been lost or destroyed at some time in the past and the species has never been found again.

From the original description, and assuming that the antennal segment count is correct, it seems likely that *Phacota* is correctly placed in the *Solenopsis*-group close to *Monomorium*; at least no other more obvious placement springs to mind. I strongly suspect that the single specimen may not truly have been a worker, as it has been interpreted in all previous attempts to understand this taxon, but may well have been an apterous ergatoid female. Characters mentioned in the original description which fuel this suspicion include the fact that the head is small, much smaller than the large gaster, and the mesonotum is saddle-shaped, a feature frequently observed in apterous females of the *Monomorium salomonis*-group. Nevertheless, with the *sichelii* holotype lost this must remain supposition and the description must continue to be treated as that of a worker, until more evidence comes to light.

Earlier attempts to understand and place the genus *Phacota* (e.g. Forel, 1917; Wheeler, 1922; and perhaps even Ettershank, 1966) were undoubtedly much influenced by Emery's (1895*a*) addition of a second species to *Phacota*. This species, *Phacota noualhieri* Emery, was based on a single worker retrieved from a nest of *Monomorium salomonis* (L.) in Algeria. Like *sichelii*, *noualhieri* has never been found again, and Emery's conjecture that it is a social parasite (or rather the degenerate worker of a socially parasitic female) may well be correct. Emery (1895*a*) pointed out that his *noualhieri* was radically different from *sichelii* in many respects but resembled it in having 11 antennal segments and a 2-segmented club. These were the characters which decided him to add *noualhieri* to *Phacota*. However, an examination of the holotype of *noualhieri* during the course of the present survey showed it to be most definitely a member of the *Monomorium salomonis*-group and to have 12-segmented antennae with a 3-segmented apical club. Emery's miscount of the number of antennomeres seems to have been caused by the specialized apical and preapical funicular segments of *noualhieri*, as described below.

Accepting that Roger's interpretation of the antennae of *sichelii* was correct, it seems best to remove *Phacota* from the synonymy of *Monomorium* and to treat it once more as a valid monotypic genus, at least for the time being. Any doubts about whether the correct placement for *Phacota* is close to *Monomorium*

or actually within the synonymy of that genus must be set aside until actual specimens of *sichelii* can again be found. The single species currently include in *Phacota* is as follows.

Phacota sichelii Roger

Phacota sichelii Roger, 1862*a*: 262, pl. 1, fig. 20. Holotype worker (?), Spain: Malaga (*Sichel*) (not in MNHU, presumed lost or destroyed).

The only other species described in *Phacota*, *noualhieri*, is now transferred to the *Monomorium salomonis*-group. A redescription of the holotype and only known specimen of *noualhieri* follows.

Monomorium noualhieri (Emery)

Phacota noualhieri Emery, 1895*a*: 299, figs 1 a-d. Holotype worker, Algeria: Biskra (*Noualhier*) (MCSN) [examined].
Monomorium noualhieri (Emery) Ettershank, 1966: 91.

Holotype worker (redescription). TL 3·3, HL 0·84, HW 0·62, CI 74, SL 0·70, SI 113, PW 0·42, AL 0·98. Mandibles with narrow blades, the masticatory margin with 4 sharp teeth. Apical tooth acute, narrow and disproportionately long, well over twice the length of the second tooth. Mandibles unsculptured and smooth. Palp formula 1,2, the single maxillary palp segment short clavate, almost bulbous. Antennal segmentation almost obliterated by partial fusion of the funicular segments, the limits of individual segments difficult to discern. Antennae with 12 segments, the apical club of 3 segments (not 11 and 2 as in the original description). The two apical club segments are flattened from side to side, the apical more so than the preapical, and almost fused together so that their junction is difficult to see. The apical club segment is slightly concave on its inner surface and convex on its outer. This may be artifact of preservation but both antennae are alike. Anterior clypeal margin with the median portion broadly evenly convex. Median portion of clypeus broadly convex across, without carinae. Frontal lobes very small and the posterior margin of the clypeus between them with the suture obliterated. Eyes fractionally behind the midlength of the sides, their maximum diameter about 0·22 × HW. Promesonotum evenly long-convex, the metanotal groove shallowly impressed. Propodeum on a lower level than the promesonotum and evenly shallowly convex, with the dorsum rounding broadly into the declivity. Petiole node in profile subglobular, with an extremely short thick peduncle; subsessile in appearance. In dorsal view the petiole node slightly broader than long, not sharply differentiated from its anterior peduncle and the latter scarcely narrower than the node. Postpetiole by contrast very reduced, occupying less than half the volume of the petiole and longer than broad. Dorsal surfaces of entire head and body lacking standing hairs. Entire ant glossy brown, smooth and shining, unsculptured except for faint superficial vestiges in places.

Santschi (1919*a*) suggested that *noualhieri* may belong to his male-based genus *Paraphacota*, and later (Santschi, 1927) even went so far as to designate *noualhieri* as a second type-species for *Paraphacota* after he had discovered that his original type-species was a male of *Monomorium subopacum* (Smith). This fruitless shifting of *noualhieri* from genus to genus, without ever the holotype being examined, only served to cloud the issue and did nothing to fix its real identity, which is now unequivocally established as a member of the *Monomorium salomonis*-group.

M. noualhieri was collected in a nest of *M. salomonis* in Algeria. The inquiline species *M. santschii* (Forel) also uses *salomonis* as a host species. Is there a possibility that *noualhieri* represents a throwback, an accidentally produced worker of *santschii* in a species otherwise known to have lost its worker caste? At present I consider the possibility to be extremely remote and suspect that *santschii* is permanently a workerless inquiline and that *noualhieri* is truly an isolated species, representing the somewhat degenerate worker caste of an otherwise unknown socially parasitic female.

ALLOMERUS Mayr

Allomerus Mayr, 1877: 873. Type-species: *Allomerus decemarticulatus* Mayr, 1877: 874; by subsequent designation of Wheeler, 1911: 158.

For current diagnosis see Ettershank, 1966: 111.

The definition of this small genus given by Ettershank (1966) requires a little modification because of a rather aberrant species described by Kempf (1975), which has been the only addition to the genus since

1966. This species, *A. vogeli* Kempf, shows that the antennal segment count in the genus as a whole may be 7–11 and that the propodeum may be unarmed or dentate. A further modification to the definition involves the dental count. Ettershank (1966) gives 4 as the number of teeth in *Allomerus* workers, but in the material which I have examined and in Kempf's (1975) species, the predominant count is 5 teeth.

At genus-level *Allomerus* now seems fairly well defined and compact, its females and workers isolated within the group by their shield-like evenly rounded clypeal structure, lack of clypeal carinae and reduction of fringing setae on the anterior clypeal margin, sometimes until only the median seta is present. These clypeal structures plus the conspicuous apomorphic character of basally constricted antennal club segments, PF 3,2, and relatively widely separated antennal insertions, all serve to identify the genus.

The general habitus of *Allomerus* is very similar to that of the South African monotypic genus *Diplomorium*. The overall similarity may be the result of convergence as *Diplomorium* lacks basally constricted antennal club segments (but does have a modified club), has PF 2,2, and retains cross-vein *m-cu* in the forewing. Set against these differences, however, is the structural similarity of the clypeus and associated structures in both genera. The position of the anterior tentorial pit, which Ettershank (1966) used to diagnose and differentiate his *Monomorium*- and *Megalomyrmex*-groups, and which thus separated *Diplomorium* from *Allomerus*, is not such a clear-cut character as first seemed to be the case. In *Allomerus* it was maintained that the anterior tentorial pit was about half way between the antennal socket and the lateral clypeal margin, this being part of the diagnosis of the relatives of *Megalomyrmex*. In material which I have examined the pit in *Allomerus* is certainly closer to the antennal socket than to the lateral clypeal margin, though not as close as in *Diplomorium*. As Kempf (1974) pointed out, the position of the pit varies even between *Solenopsis* and *Oxyepoecus*, the two members of Ettershank's *Solenopsis*-group, so too much emphasis should not be placed on this character alone.

There is therefore a possibility that *Allomerus* and *Diplomorium* are close in a phylogenetic sense, but further investigation is essential to prove or disprove the contention. Perhaps the discovery of the still unknown male of *Diplomorium* would shed a little more light on the matter.

In *Allomerus* the species-level taxonomy of this small neotropical genus remains in a very confused state, with many infraspecific names of dubious status still extant (Kempf, 1972).

ANTICHTHONIDRIS Snelling

Antichthonidris Snelling, 1975: 5. Type-species: *Monomorium denticulatum* Mayr, 1887: 614; by original designation.

For diagnosis of the genus see Snelling (1975); for distribution and notes on species see Snelling & Hunt (1975).

This small Chilean and southern Argentinian genus contains only two species and has its origins in Ettershank's (1966) genus *Nothidris* (see there). The latter was created to hold three Neotropical species which Ettershank decided to separate from *Chelaner* (itself now a junior synonym of *Monomorium*). Whilst reviewing the Chilean fauna Snelling (1975) noted that two of the species included in *Nothidris*, *denticulata* (Mayr) and *bidentata* (Mayr), were generically distinct from the third (type-species) of the genus *Nothidris*, *latastei* (Emery). Accordingly he created the genus *Antichthonidris* to accommodate the first two species.

As both species of *Antichthonidris* are frequently found sharing a single nest it has been postulated that one is socially parasitic upon the other, or perhaps even dulotic (see notes and references in Ettershank (1966) and in Snelling & Hunt (1975)) but no direct investigation of the real relationship between the two has ever been undertaken.

Snelling separated his new genus in the females and workers on characters of palp formula (*Nothidris* PF 4,3; *Antichthonidris* PF 2,2), presence of simple tibial spurs on the middle and hind legs in *Nothidris*, and the presence of a larger and more prominent median clypeal lobe in *Antichthonidris*. The male of the latter had PF 3,2 and well-developed notauli on the mesoscutum.

The size and prominence of the median clypeal lobe can be discounted in terms of diagnosing the genus as it varies considerably in most genera of the group. Snelling apparently used it just to differentiate his genus from *Nothidris* alone. An interesting point which he raised is that the taxonomic position of *Antichthonidris* may lie outside the *Solenopsis*-group of genera. He said, 'it is evident that these ants do not belong among the *Monomorium-Solenopsis* series of genera, since the males of these groups lack notauli.' Snelling continued by saying that some worker and female characters suggested a relationship with *Stenamma*, but that the male habitus was quite different, and concluded that it 'seems best to leave *Antichthonidris* unassigned until all myrmicine genera can be re-evaluated.'

Having examined both *Antichthonidris* species I must conclude that membership in the *Solenopsis*-group

as defined here is the best fit that can currently be achieved for the genus. Snelling's objection that males of the *Solenopsis*-group lack notauli is discounted as the character is very variably developed in *Monomorium* and ranges from strong to absent in the Australasian fauna alone. In workers and females the position of the petiolar spiracle in *Antichthonidris* is characteristic of the *Solenopsis*-group and not of *Stenamma* where the spiracle tends to be very close to the anterior articulation of the peduncle.

The Australian fauna (material examined from ANIC) has revealed a few indeterminate species which appear very similar to the type-species of *Antichthonidris* and are almost certainly congeneric with it. In general all main characters are the same but the Australian forms mostly have longer propodeal spines and more stocky postpetiole nodes. Such characters are not presently considered useful at genus-level. Only a detailed study of the Australasian fauna will show if these species grade into *Monomorium*, if they are really congeneric with the Neotropical *Antichthonidris*, and if this latter genus represents merely a Neotropical isolate of the much more extensive Australasian fauna, as appears to be the case with *Nothidris*.

NOTHIDRIS Ettershank

Nothidris Ettershank, 1966:105. Type-species: *Monomorium latastei* Emery, 1895*c*: 10; by original designation.

In his original description of *Nothidris* Ettershank included three species, *latastei*, *bidentata*, and *denticulata*. Snelling (1975) removed the last two names to a separate genus, *Antichthonidris* (see above), described a new species in *Nothidris*, *cekalovici*, and transferred another species, *bicolor* (Ettershank), out of *Megalomyrmex* into *Nothidris*. The genus as presently constituted thus contains three closely related species which appear to be restricted in their distribution to relatively high altitudes in Chile. Snelling (1975) and Snelling & Hunt (1975) give keys to the species of *Nothidris*.

Prior to Ettershank's (1966) creation of *Nothidris* its type-species, *latastei*, had been included, along with numerous Australian forms, in a subgenus of *Monomorium* called *Notomyrmex* (see Emery, 1922). In Ettershank's study *Notomyrmex* was given as a junior synonym of *Chelaner*, which he treated as a valid genus, excluding from the latter only those southern Neotropical forms isolated to constitute his genus *Nothidris*. Ettershank maintained that *Nothidris* was related to *Megalomyrmex*, which is true only insofar as all genera in this group are related, but he reiterated that the general habitus of *Nothidris* was that of the Australasian species referred by him to *Chelaner* (the latter being regarded in this paper as a junior synonym of *Monomorium*). With the removals from and additions to *Nothidris* carried out by Snelling (1975) it became apparent that Emery (1922) was correct in associating *latastei* with the Australasian fauna, and further that *Nothidris* represents nothing more than a specialized southern Neotropical fraction of that fauna. Ultimately it may become necessary to synonymize *Nothidris* under *Monomorium*.

The reasoning behind this possibility lies in the breakdown and obliteration of diagnostic characters supposedly separating *Nothidris* from those Australasian species-groups formerly constituting *Chelaner* in the sense of Ettershank (1966). All species currently retained in *Nothidris*, i.e., excluding the two removed by Snelling (1975), should fit Ettershank's diagnosis after the palp formula character has been modified to take Snelling's exclusions into account. Ettershank gives:

(1) The palp formula in *Nothidris* is 4,3; in *Chelaner* it is 2,3 or 2,2.

(2) The anterior tentorial pits in *Nothidris* are about half way between the antennal sockets and the lateral margins of the clypeus; in *Chelaner* the anterior tentorial pits are situated very near the antennal sockets.

The palp formula holds, for what it is worth. All current *Nothidris* have PF 4,3 in the worker and this count remains unknown in *Monomorium* as presently defined. Unfortunately *Monomorium* species are now known which show palp formulae of 5,3; 3,3; 2,3; 2,2; 1,2; and 1,1. Notice that the only count missing from this otherwise evenly stepped morphoclinal reduction is 4,3, the palp formula of *Nothidris*.

As for the anterior tentorial pits, they are no further away from the antennal sockets in *N. latastei* than they are in many Australasian *Monomorium* (= *Chelaner*) species; the character has no validity in this case and does not exist in reality. The detailed structure of all aspects of the head in *Nothidris* species is the same as that shown in Australian *Monomorium* such as *sanguinolentum* Wheeler, *turneri* (Forel) and *rubriceps* Mayr, and the modification of the propodeum into small bilaterally flattened teeth or prominent angles, at the junction of the dorsum and declivity, shows the same kinds of development in both groups.

One character which Ettershank (1966) mentions as diagnostic of *Chelaner* is the presence of a vestibulate propodeal spiracle, which is not mentioned for any other genus in his review. Throughout the Australian *Monomorium* species-groups which formerly constituted *Chelaner* there is considerable variation in the expression of this character, but it is also present in *Nothidris*, being conspicuous in *latastei* (the type-species) and *bicolor*, less obvious in *cekalovici*.

Thus *Nothidris* is at best an extremely feeble genus, maintained as distinct more by its zoogeography than its morphology, which is an unsatisfactory state of affairs. I strongly suspect that a taxonomic study of the Australian *Monomorium* species-groups, especially the core-groups of larger species which formerly constituted *Chelaner*, will see the formal synonymy of *Nothidris* under *Monomorium*.

MEGALOMYRMEX Forel

Megalomyrmex Forel, 1884: 371. Type-species: *Megalomyrmex leoninus* Forel, 1884: 372; by monotypy.

For diagnosis and current synonymy see Ettershank, 1966: 101.

Ettershank (1966) listed 25 names in this genus, of which only three represented infraspecific taxa. Since then Kempf & Brown (1968) have established a fairly extensive synonymy for one species; Kempf (1970) has added 3 more species to the genus, and Snelling (1975) has correctly removed *bicolor* from the genus and transferred it to *Nothidris* (see there). Thus *Megalomyrmex* currently contains 22 named forms but taxa remaining to be described will probably bring this total up to 25–30.

The form of the mandible found in the small *M. modestus*-group contradicts character (1) of the genus-group diagnosis. The form of dentition in this species-group is, however, very obviously a secondary proliferation from a sparsely dentate original pattern, and is not homologous with the serially multidentate mandibles seen in some other myrmicine genus-goups, where the teeth are all well defined and regularly decrease in size from apex to base. In the *M. modestus*-group either the original 5 teeth become interspersed with small denticles or a series of minute denticles develops behind the preapical or behind the third tooth.

Megalomyrmex is closely related to *Monomorium* but is separated by the presence in the former of an arched transverse rim or carina which traverses the propodeal declivity between the uppermost parts of the metapleural lobes, and the possession of PF 4,3 or 3,2, combinations not presently known from *Monomorium*. Despite this the genus remains poorly differentiated from *Monomorium*, especially the extensive Australasian fauna of the genus. Ettershank (1966) records a count of 4 malpighian tubules from *Monomorium* and 5 from *Megalomyrmex*. Unfortunately only very few species have been examined for this character so its universality and usefulness cannot presently be ascertained.

SOLENOPSIS Westwood

Solenopsis Westwood, 1841: 86. Type-species: *Solenopsis mandibularis* Westwood, 1841: 86 (= *Atta geminata*, F., 1804: 423); by monotypy.

For diagnosis and current synonymy see Ettershank, 1966: 134.

Of the 10 genus-level synonyms of *Solenopsis* proposed by Ettershank (1966) only *Diplorhoptrum* Mayr has so far been challenged. Baroni Urbani (1968*a*) suggested that this name should be retrieved from the synonymy and applied as a valid genus to hold the species related to *fugax* (Latreille). The suggestion has been accepted by several authors in the Palaearctic region (e.g. Kutter, 1977; Bernard, 1977; Collingwood, 1978, 1979; Onoyama, 1980) whilst dealing with local faunas, and elsewhere the name has been used as a subgenus (e.g. Thompson, 1982), but it has not gained universal acceptance and elsewhere *Diplorhoptrum* continues to be treated as a synonym of *Solenopsis* (e.g. Brown, 1973; Kempf, 1972; Snelling, 1975; Krombein *et al.*, 1979; and this current review).

Baroni Urbani's (1968*a*) arguments were based on characteristics of the male genitalia and his results were obtained by comparison of members of the *fugax*-group with members of the *geminata*-group. Whilst accepting that the differences pointed out by Baroni Urbani are real, I am unable to regard them as being significant above the species-group level. The taxonomic level of the genitalic characters is certainly far lower than those utilized to discriminate genera, not only in the *Solenopsis*-group but throughout the Myrmicinae, and in general are at the level used to distinguish species-groups. No one I think would argue that *fugax* and *geminata* are not different at species-group level, but the higher characters which link them are so strong and consistent that there is no reason to regard the two groups as belonging to different genera. Finally, the male genitalic characters of other *Solenopsis* species-groups have not been compared, so there is no real evidence that the characters noted by Baroni Urbani (1968*a*) function on a world-wide basis even at species-group level.

Kutter (1977) gives an antennal character to separate the female castes of *Diplorhoptrum* and *Solenopsis* (properly the *fugax*- and *geminata*-groups). This is a very minor character indeed, devised solely to separate the European species, and is meaningless on a world-wide basis, the only basis upon which

genus-level characterizations can be successfully organized. Again, the taxonomic level of Kutter's character is far below that considered useful in separating genera. Collingwood (1979) merely gives the main diagnostic characters of *Solenopsis* and adds Baroni Urbani's (1968*a*) male genitalic feature to differentiate *Diplorhoptrum*.

Apart from the large conspicuous species which constitute the *geminata*-group the species-level taxonomy of *Solenopsis* is quite frankly in an appalling condition. On the one hand the Neotropical region contains dozens of minute species, some of them extremely abundant, which remain totally univestigated. On the other hand the western Palaearctic has suffered enormously from gross oversplitting within the *fugax*-group, the only native species-group in the region. Bernard (1949, 1977) has himself described an utterly unbelievable 15 species from southern France alone, on top of the older established named forms. He maintains (Bernard, 1977) that 20 species occur in France, though his keys give only 18 names. There is no doubt that at species-level *Solenopsis* is greatly in need of synthesizing taxonomic studies conducted on a world-wide basis. Parochialism and 'mihi-itch' have created an overabundance of vague and unrecognizable taxa in this important genus; serious investigation of its species-level taxonomy is long overdue.

OXYEPOECUS Santschi

Oxyepoecus Santschi, 1926*c*: 6. Type-species: *Oxyepoecus bruchi* Santschi, 1926*c*: 6, figs A-D; by monotypy.

For definition of the genus and its current synonymy see Ettershank (1966) and Kempf (1974); the latter also provides a species-level revision, the first description of a male, and keys. Genus-level synonyms given in these publications remain unchallenged.

With 11 species currently recognized *Oxyepoecus* constitutes a well-defined and somewhat isolated small Neotropical genus of the *Solenopsis*-group. Most samples of this genus have been found as foragers retrieved from leaf litter samples, but two *Oxyepoecus* species are inquilines in nests of *Pheidole* species and a third may be an inquiline in nests of *Solenopsis*, though evidence supporting the latter is circumstantial and insecure. Kempf (1974) summarizes what little is known of these species but is unable to say whether the two certain inquilines are temporary or permanent social parasites, or whether a xenobiotic lifeway is involved.

Both Ettershank (1966) and Kempf (1974) agree that *Oxyepoecus* is closely related to the much larger genus *Solenopsis*. The former author placed the two genera together in a single group but the latter was unsure that Ettershank's genus-groups were sufficiently closely defined, especially as the then newly discovered male of *Oxyepoecus* resembled that of *Megalomyrmex* more than that of *Solenopsis*.

The present review has little to add at genus-level to the previous studies. The close relationship of this genus with *Solenopsis* is reaffirmed, strong linking characters including those given in the previous studies. Consistent characters separating the two genera are as follows.

Solenopsis	*Oxyepoecus*
Antennal club of 2 segments in the worker and female.	Antennal club of 3 segments in the worker and female.
Antennae with 10 segments in worker.	Antennae with 11 segments in worker.
Propodeum unarmed in worker and female.	Propodeum dentate in worker and female.
First funicular segment globular in male.	First funicular segment cylindrical in male.
Mandibles with 1–2 teeth in male.	Mandibles with 4 teeth in male.

CAREBARELLA Emery

Carebarella Emery, 1905: 137. Type-species: *Carebarella bicolor* Emery, 1905: 138; by monotypy.

For diagnosis and current synonymy see Ettershank, 1966: 113.

This small and poorly understood genus remains as Ettershank left it, the only addition since that time being the description of a fourth species, *C. alvarengai*, by Kempf (1975), based on an alate female.

Ettershank placed *Carebarella* among the relatives of *Megalomyrmex* but I suspect that the genus may in fact be closer to *Solenopsis*, as Emery (1922) indicated. The reasons for this include the presence of geniculate maxillary palps in *Carebarella* along with a clypeal structure which appears derived, in the worker at least, from a *Solenopsis*-like ancestral form. Also there is dimorphism of antennal form between worker and female in *Carebarella*, a feature also encountered in *Solenopsis* but not in the allies of *Megalomyrmex*.

MONOMORIUM Mayr

(Figs 18–100)

Monomorium Mayr, 1855: 452. Type-species: *Monomorium monomorium* **nom. n.** (replacement name for *Monomorium minutum* Mayr, 1855: 453, junior secondary homonym of *Atta minuta* Jerdon, 1851: 105 [= *M. pharaonis* (L.), 1758: 580]); by monotypy. [See note 1, below.]

Trichomyrmex Mayr, 1865: 19. Type-species: *Trichomyrmex rogeri* Mayr, 1865: 19; by monotypy. [Synonymy by Ettershank, 1966: 82.]

Lampromyrmex Mayr, 1868: 93. Type-species: *Monomorium mayrianum* Wheeler, 1915: 45 (replacement name for *Lampromyrmex gracillimus* Mayr, 1868: 95 (ex Baltic amber), junior secondary homonym of *Monomorium gracillimum* (Smith), 1861*a*: 34); by monotypy. [Synonymy by Wheeler, 1915: 45; Ettershank, 1966: 82.]

Holcomyrmex Mayr, 1878: 671. Type-species: *Holcomyrmex scabriceps* Mayr, 1878: 672; by subsequent designation of Bingham, 1903: 280. [Synonymy by Ettershank, 1966: 82.]

Epoecus Emery, 1893*a*: cclxxvi. Type-species: *Epoecus pergandei* Emery, 1893*a*: cclxxvi; by monotypy. [Synonymy by Ettershank, 1966: 82.]

Wheeleria Forel, 1905: 171. Type-species: *Wheeleria santschii* Forel, 1905: 171; by monotypy. [Junior homonym of *Wheeleria* Tutt, 1905: 37 (Lepidoptera).]

Wheeleriella Forel, 1907*c*: 145 (replacement name for *Wheeleria* Forel, 1905: 171). [Synonymy by Ettershank, 1966: 82.]

Epixenus Emery, 1908*a*: 556. Type-species: *Monomorium advena* Brown & Wilson, 1957: 244 (replacement name for *Epixenus andrei* Emery, 1908*a*: 557, junior secondary homonym of *Monomorium andrei* Saunders, 1890: 204); by subsequent designation of Wheeler, 1911: 163. [Synonymy by Brown & Wilson, 1957: 244.]

Mitara Emery, 1913: 261 [as subgenus of *Monomorium*]. Type-species: *Monomorium laeve* Mayr, 1876: 101; by original designation. [Synonymized with *Monomorium (Lampromyrmex)* by Emery, 1922: 183 and Wheeler, 1922: 162.]

Chelaner Emery, 1914: 410 [as subgenus of *Monomorium*]. Type-species: *Monomorium (Chelaner) forcipatum* Emery, 1914: 410; by subsequent designation of Emery, 1922: 168. [Raised to genus by Ettershank, 1966: 93.] **Syn. n.**.

Notomyrmex Emery, 1915: 190 [as subgenus of *Monomorium*]. Type-species: *Atta antarctica* Smith, 1858: 167; by original designation. [Synonymized with *Chelaner* by Ettershank, 1966: 93.] [See note 2, below.]

Xeromyrmex Emery, 1915: 190 [as subgenus of *Monomorium*]. Type-species: *Formica salomonis* L., 1758: 580; by original designation. [Synonymy by Ettershank, 1966: 82.]

Parholcomyrmex Emery, 1915: 190 [as subgenus of *Monomorium*]. Type-species: *Myrmica gracillima* Smith, 1861*a*: 34 [= *Monomorium destructor* (Jerdon), 1851: 105]; by original designation. [Synonymy by Ettershank, 1966: 82.]

Syllophopsis Santschi, 1915: 259 [as subgenus of *Monomorium*]. Type-species: *Monomorium modestum* Santschi, 1914*b*: 17; by monotypy. [Raised to genus by Santschi, 1921*b*: 119.] **Syn. n.**

Corynomyrmex Viehmeyer, 1916: 134 [as subgenus of *Monomorium*]. Type-species: *Monomorium (Corynomyrmex) hospitum* Viehmeyer, 1916: 133; by monotypy. [Provisional synonymy by Ettershank, 1966: 82, here confirmed.]

Isolcomyrmex Santschi, 1917: 296 [as subgenus of *Monomorium*]. Type-species: *Monomorium santschianum* Ettershank, 1966: 92 (replacement name for *Holcomyrmex santschii* Forel, 1907*d*: 203, junior secondary homonym of *Monomorium santschii* (Forel), 1905: 171); by original designation. [Synonymy by Ettershank, 1966: 82.]

Paraphacota Santschi, 1919*a*: 90. Type-species: *Paraphacota surcoufi* Santschi, *1919a*: 90 [= *Monomorium subopacum* (Smith), 1858: 127]; by monotypy. [Synonymy by Santschi, 1927: 243.]

Equestrimessor Santschi,1919*a*: 92 [as subgenus of *Monomorium*]. Type-species: *Holcomyrmex chobauti* Emery, 1897*a*: 418; by subsequent designation of Donisthorpe, 1943*b*: 644. [Synonymy by Ettershank, 1966: 82.]

Xenhyboma Santschi, 1919*c*: 405. Type-species: *Xenhyboma mystes* Santschi, 1919*c*: 405 [= *Monomorium medinae* Forel, 1892*b*: 454]; by monotypy. [Provisional synonymy by Ettershank, 1966: 82, confirmed by Espadaler, 1982: 112.]

Protholcomyrmex Wheeler, 1922: 162 [as subgenus of *Monomorium*]. Type-species: *Monomorium rothsteini* Forel, 1902*b*: 444; by original designation. [Synonymized with *Chelaner* by Ettershank, 1966: 93.]

Ireneidris Donisthorpe, 1943*a*: 81. Type-species: *Ireneidris myops* Donisthorpe, 1943*a*: 81 [= *Monomorium talpa* Emery, 1911: 252]; by original designation. [Synonymy by Ettershank, 1966: 82.]

Schizopelta McAreavey, 1949: 14. Type-species: *Schizopelta falcata* McAreavey, 1949: 15; by original designation. [Synonymized with *Chelaner* by Ettershank, 1966: 93.]

Pharaophanes Bernard, 1952: 238 (attributed to Santschi; without description and without designation of type-species). [Nomen nudum.]

Note 1, the type-species of *Monomorium*.

Since its inception as a genus the type-species of *Monomorium* has been stated as *M. minutum* Mayr (1855), but for some unknown reason all later authors appear to have overlooked the fact that *minutum* Mayr is a junior secondary homonym of *Atta minuta* Jerdon (1851), which is itself a junior synonym of *M. pharaonis* (L.).

Jerdon's short diagnosis of *Atta minuta* and his description of its habits leaves no doubt that its true identity is *pharaonis*. He says that 'this minute species makes a temporary nest in various situations, in an empty box, between the back of a book and its leaves, even among the loose pages of a book, in an empty shell, &c. &c. Nothing is used in its construction, a shelter from the light merely being sought for.' He also says that it is 'very common in the Carnatic and most of India', and that it 'appears to prefer dead animal matter to saccharine or vegetable products.'

As far as I can ascertain *minuta* Jerdon appeared as a synonym of *pharaonis* for the first time in Emery (1892) and the synonymy is repeated in Dalla Torre (1893). Earlier Mayr (1878) had suggested that *minuta* Jerdon and *vastator* Smith were conspecific. Examination of the *vastator* type-material confirms that its synonymy with *pharaonis* by Donisthorpe (1932) was correct. Bingham (1903) included *minuta* Jerdon as a synonym of *pharaonis* and it is most likely that he had access to, and examined, Jerdon's now vanished material.

All this serves to confirm that *Atta minuta* Jerdon truly belongs in *Monomorium* and is a valid junior synonym of *pharaonis*. This leaves *M. minutum* Mayr as a junior homonym in need of a replacement name.

In the past some 17 infraspecific taxa of *minutum* Mayr have been described. None of these infraspecific names applied to southern European forms (the type-locality of *minutum* Mayr is in Italy) and only one, *chinense* Santschi, was described from the Palaearctic region. Other supposed infraspecific forms of *minutum* Mayr originated in the Afrotropical region, Madagascar, Sri Lanka, Java, Hawaii, Samoa, North America and Brasil. Examination of the available type-material of these forms and comparison of that material with the type-series of *minutum* (in NMV) leads me to conclude that only *chinense*, *javanum* Forel, and *liliuokalanii* Forel (= *samoanum* Santschi) belong in the same species-complex as *minutum* Mayr. The last two names were given as junior synonyms of *minutum* by Wilson & Taylor (1967) but I do not consider them conspecific and suspect that they may in fact be synonymous with *chinense*, which appears to be valid and distinct from *minutum* Mayr. Finally I suspect that the southern European populations currently referred to as *minutum* Mayr may in truth consist of two separate species.

Hence none of the current infraspecific names is taxonomically available as a replacement for the junior homonym *minutum* Mayr, and I have designated the name *Monomorium monomorium* as a replacement for *M. minutum* Mayr.

Note 2, authorship and date of *M. antarcticum*, type-species of *Notomyrmex*.

Earlier catalogues such as Mayr (1863), Dalla Torre (1893), and Emery (1922) all regarded Smith (1858) as the author of the species-level name *antarctica*, but Brown (1958) and Ettershank (1966) refer the name to White and date it 1848. Brown gives Hutton (1881) as the authority for this date but the entry under *antarctica* in this last publication refers back only to Smith (1858).

Smith's (1858: 167) notation of this name gives '*Atta antarctica*' and is sub-headed '*Formica antarctica*, White, Zool. Erebus & Terror, pt. 2.' The section of the 'Zoology of the Voyage of H.M.S. Erebus & Terror' which deals with insects has Adam White and Arthur Gardiner Butler as joint authors, and the date on this part is given as 1846–1874! However, the 'contents' of volume 2 indicate that the insects were dealt with in two sections, the first of which, pp. 1–24, was by White and is dated 1846. The second part, pp. 25–51, was by Butler and is dated 1874. This same information is repeated in the massive review of early entomological literature by Horn & Schenkling (1929), who added that plates 1–6 accompanied pp. 1–24, which appeared in 1846 with White as author.

Unfortunately the name *antarctica* in the 'Voyage of H.M.S. Erebus & Terror' publication is on page 27 and plate 7, as *Aphaenogaster antarctica*, and appeared in 1874 with Butler as author. Secondary notations below this name include '*Formica antarctica*, White Ms, tab. 7, f. 13,' and '*Atta antarctica*, Smith, Cat. Hymenopt. Ins. 6 p. 167,' indicating that Butler was aware that the name was already extant in the literature and available by dint of Smith's (1858) publication.

All this internal evidence seems to show that Smith had access to the then unpublished notes of White referring to insects of the Erebus & Terror voyage which had not been included in White's (1846)

publication (which finally appeared in Butler, 1874). Thus by using the name *Atta antarctica*, and producing a description of the species from White's unpublished manuscript, Smith (1858) became the valid author of the name.

WORKER. Minute (TL < 1·5) to moderate (TL *ca* 8.0) sized monomorphic to polymorphic myrmicine ants. Palp formula predominantly 2,2 but counts of 5,3; 3,3; 2,3; 1,2; and 1,1 are known in some individuals or discrete species-groups. Mandibles with 3–5 teeth (4 is the vastly predominant count) which decrease in size from apex to base. Basalmost tooth sometimes reduced to a minute offset denticle. Median clypeal seta conspicuous. Median portion of clypeus raised, the raised section longitudinally bicarinate; the carinae usually distinct but sometimes reduced or blunt and rounded. Frontal carinae absent behind frontal lobes. Antennal scrobes absent. Antennae 10–12 segmented (most frequently 12), usually with a conspicuous 3-segmented club but in some the club 4-segmented or not clearly defined; club never of 2 segments. Eyes present, usually conspicuous but reduced in some; reduced to a single ommatidium in the *fossulatum*-group (Fig. 94). Eyes situated at or in front of the midlength of the head side. Metapleural glands of moderate size, never enormously hypertrophied. Metapleural lobes usually small and rounded. Metanotal groove present, commonly impressed. Propodeal dorsum usually unarmed and rounding into the declivity, some individuals or whole species-groups with the propodeum angulate, denticulate, or with short angular lamelliform projections; developed propodeal spines extremely rare. Propodeal spiracle usually circular and located at about the midlength of the sclerite, rarely slightly behind the midlength; the spiracle oval to slit-shaped in the *scabriceps*-group (Fig. 33). Fore coxae larger than middle and hind coxae but not grossly enlarged. Petiole pedunculate anteriorly, the petiolar spiracle usually close to or at the node, only rarely close to the midlength of the peduncle (*scabriceps*-group, Fig. 33, and some Australian species). Petiole node generally subconical to cuneate in profile, and narrowly rounded above. Petiolar peduncle with a small anteroventral process, only rarely the process vestigial or lacking. Sting strong to very feebly developed, in many linear-subspatulate apically but lacking lamelliform appendages at an angle to the long axis of the sting.

FEMALE. Larger than conspecific worker, sometimes very much larger. Head not disproportionately small in comparison to alitrunk, the HW usually equal to or greater than the maximum width of the mesoscutum, only rarely slightly narrower. Usually alate and with a full complement of flight sclerites but numerous species with apterous to extremely ergatoid females, these wingless forms showing a finely stepped morphoclinal reduction in size and number of alitrunk sclerites (Figs 27–30). A few species with worker-female intergrades. Characters as worker but eyes larger and sometimes slightly behind the midlength of the sides. Ocelli present except in some extreme ergatoids. Short flattened propodeal spines occur in a few ergatoids. On the forewings of alates the radial cell is always open and cross-vein *r-m* absent. Cross-vein *m-cu* is conspicuous in a few groups (Figs 18, 19) but is usually absent. Species of the *scabriceps*-group show its disappearance (Figs 19–21) and sometimes an individual may have *m-cu* present on one forewing but absent from the other. In small or minute species of all groups cross-vein *cu-a* tends to vanish (Figs 23, 24). Primitively all veins are tubular and strongly sclerotized (Figs 18–21) but in most groups the veins are predominantly depigmented and flattened, or reduced to vestigial lines (Figs 22, 23). In the last case *R* + *Rs* and *2r* plus the distal portion of *Rs* usually remain broader and more strongly sclerotized than the remaining veins (Figs 22, 23). Axillae frequently large and almost meeting at the midline, in some groups the axillae partially or wholly fused and stretching as a band across the entire dorsum. Mesoscutum and scutellum never abutting, always separated by the axillae or, where the axillae are separated mid-dorsally, by a broad impression.

MALE. Usually the same size as or a little smaller than the conspecific female, generally much larger than the worker but in the *scabriceps*- and *destructor*-groups the males are very small indeed. Head width at maximum about equal to the width of the mesoscutum except in the two groups just mentioned, where the head is disproportionately small and much narrower than the mesoscutum. PF as in workers. Mandibles with 1–4 (usually 3–4) teeth, the basalmost sometimes reduced to a minute denticle. Median clypeal seta conspicuous, median portion of clypeus not bicarinate. Antennae with 11–13 segments, not clavate apically. Scape cylindrical to globular, first funicular segment cylindrical to globular (Figs 25, 26). Eyes large, usually situated near the midlength (Fig. 25) but in the *scabriceps*- and *destructor*-groups situated anteriorly, abutting the clypeus (Fig. 26). Ocelli conspicuous, turreted in some groups. Parapsidal furrows distinct to vestigial. Notauli usually absent, only rarely present. Mesoscutum frequently with a V-shaped unsculptured or more weakly sculptured area anteromedially. Venation as alate female. Axillae small and separated by a transverse impression, sometimes fused to scutellum and more rarely also fused to scutum. Axillae extend as a band across the dorsum in *scabriceps*- and *destructor*-groups. Male frequently more strongly sculptured than conspecific female or worker.

Monomorium is a large and extremely diverse genus which contains at present some 300 valid species, of which about half occur in the Afrotropical zoogeographical region. The estimate of the world fauna is very much a guess as the species of most zoogeographical regions have never been revised or subjected to any synthesizing taxonomic treatment. As the genus is defined here the vast majority of *Monomorium* species inhabit the Old World, particularly the tropics. Very few endemic species occur in North America (DuBois, 1986), and even fewer in the neotropical region where *Monomorium* is mostly replaced by an extensive *Solenopsis* fauna (Kempf, 1972). The main centres of speciation of *Monomorium* include Africa and Australia, with secondary centres in the Oriental region (Bingham, 1903) and Madagascar. The Malagasy fauna is particularly interesting as it contains some small endemic species-groups, one of which (with two indeterminate species) shows the highest and hence most primitive PF count (5,3) yet encountered in the genus. In general the species-groups of *Monomorium* are not restricted to a single zoogeographical region but tend to be widely distributed. However, some small specialized groups have a much more restricted range. Most species-groups remain to be defined on a world-wide basis. The groups occurring in the Afrotropical region, revised below, are so defined, but the large and fascinatingly diverse Australasian fauna contains a good number of endemic species-groups which await accurate delineation. After Africa Australia contains the most diverse and widely radiated fauna of the genus and a taxonomic study of it is long overdue, especially in the light of the fact that the Neotropical genera *Nothidris* and *Antichthonidris* appear to be nothing more than isolated fractions of this fauna.

Workers of *Monomorium* show a striking morphological diversity from group to group but within species-groups tend to be relatively uniform in structure. The most strongly modified forms include the large granivores of the *scabriceps*-group, but these constitute only a small fraction of the fauna, most species of which are scavengers or active predators. Females for the most part share the characters exhibited by the workers. In some groups, particularly the *salomonis*- and *monomorium*-groups, there is a marked tendency for the females to become apterous and ergatoid. It has been postulated (Bolton, 1986*b*) that this phenomenon is associated with a shift in dispersal strategy from mating flight followed by claustral nest founding to autoparasitism followed by colony fission. Males remain poorly known in the genus but for the most part present a fairly uniform habitus except in the *scabriceps*- and *destructor*-groups where they have convergently come to resemble the males of *Solenopsis*.

Monomorium contains some of the world's most widely distributed and successful tramp-species, including the cosmopolitan *pharaonis* (L.) and *floricola* (Jerdon), the pantropical *destructor* (Jerdon), and the Old World tropical *latinode* Mayr, *subopacum* (Smith), and *talpa* Emery.

Apart from the references given above, recent taxonomic works on *Monomorium* at species-level are very sparse. Mention may be made of Wilson & Taylor (1967) for the Polynesian fauna, Baroni Urbani (1964*a*, 1964*b*, 1968*b*) for the Italian fauna, Bernard (1968) for the west European fauna, Brown (1958) for the fauna of New Zealand, Collingwood (1978) for the fauna of the Iberian Peninsula. Older synoptic studies, now rather outdated but still retaining some value include Arnold (1916), Bingham (1903), Emery (1908*a*, 1908*b*), and Santschi (1936).

The genus-level synonyms of *Monomorium*

The current genus-level synonymy of *Monomorium* is extensive, including some 22 names at the present time. Discounting nomina nuda these names consist of a number of supposed oddities which were originally described as separate small genera, and a welter of moderately to extremely poorly defined subgenera which were described in the first quarter of this century. In terms of the species-group concept employed in this paper the various genus-level synonyms are dispersed as follows among the groups.

Species-group in this paper.	Genus-level synonyms of *Monomorium* applicable to that group.
M. salomonis-group	*Epixenus, Paraphacota, Wheeleriella, Xenhyboma, Xeromyrmex.*
M. scabriceps-group	*Holcomyrmex, Trichomyrmex.*
M. destructor-group	*Equestrimessor, Isolcomyrmex, Parholcomyrmex.*
M. fossulatum-group	*Ireneidris, Syllophopsis.*
M. monomorium-group	*Corynomyrmex, Epoecus, Lampromyrmex, Mitara.*
M. forcipatum-group	*Chelaner, Notomyrmex.*
M. falcatum-group	*Schizopelta.*
M. rothsteini-group	*Protholcomyrmex.*

Phacota, included by Ettershank (1966) as a synonym of *Monomorium*, is here returned to its previous status as a separate genus, for reasons given under its discussion, p. 281.

Baroni Urbani (1964*a*: 50) described a genus *Xenoaphaenogaster* based on a single worker discovered in a nest of *Aphaenogaster pallida* (Nylander). The holotype and only known specimen of the type-species, *X. inquilina* Baroni Urbani, has since been lost. In the original description Baroni Urbani placed

Xenoaphaenogaster in the tribe Solenopsidini as it was then understood, close to *Monomorium*. Later Brown (1973) treated the name as a provisional synonym of *Monomorium*, a position reiterated by Krombein *et al.* (1979). This placement is certainly incorrect and *X. inquilina* is not to be associated with *Monomorium* or its close relatives. In my opinion, based on the original description and figures, the now-vanished holotype of *X. inquilina* may well have been a minor worker of *Pheidole pallidula* (Nylander). I hereby provisionally synonymize *X. inquilina* under *P. pallidula*, so that the genus-level name *Xenoaphaenogaster* falls into the synonymy of *Pheidole*.

Genus-level names applicable to the *Monomorium salomonis*-group.

Wheeleriella Forel (1907*c*).

Forel (1905) erected the name *Wheeleria santschii* for a monomoriine inquiline female found with *M. salomonis* in Tunisia. He observed that it was 'probably a parasitic derivative of the genus *Monomorium*.' Later Forel (1907*c*) noted that the genus-level name *Wheeleria* was preoccupied, and proposed *Wheeleriella* as a replacement.

In the following two decades the names of four more inquilines were added to *Wheeleriella*. These included *wroughtoni* Forel (1910*a*) from India (which is incidentally a junior homonym of *M. wroughtoni* Forel (1902), a replacement name is proposed below), and *adulatrix* Santschi (1913*b*), *rufescens* Santschi (1926*b*), and *insidiosa* Santschi (1926*b*), all from Tunisia. The last three names were all treated as infraspecific forms of *santschii* by Santschi (1926*b*) and the present survey regards them all as very minor variations within the species-limits of *santschii*, and hence junior synonyms of that name.

All samples known to the present have been found at the entrances to nests or within nests of *salomonis*-group members. According to Forel (1906) and Santschi (1913*b*) females of *santschii* approach the host nest and wait for a while at the entrance. They are soon accepted by the host workers and gain entry to the nest. Shortly thereafter the host workers kill their own reproductive female and adopt the inquiline, which goes on to lay numerous eggs. These produce only females and males; the worker caste has been lost.

The name *Wheeleriella* was summarily synonymized with *Monomorium* by Ettershank (1966), without further comment. Whilst agreeing totally with Ettershank's conclusion it must be pointed out that the former members of *Wheeleriella* are, morphologically, only very slightly modified from other members of the *salomonis*-group, and that the five names formerly included in *Wheeleriella* represent at most two, and possibly even only one, valid species.

The females are very obviously specialized members of the *salomonis*-group in which the eighth funicular segment is enlarged to form a 4-segmented club and the occipital margin of the head has become strongly concave. The same modification of the head occurs weakly in the males, but their funiculi are normal for the *salomonis*-group. In both sexes the mesoscutum is flattened and bulges forward anteriorly so that it overhangs the pronotum, and in females the petiole and postpetiole nodes are anteroposteriorly compressed. These last two characters occur, though not as strongly developed, elsewhere in the *salomonis*-group. For example, the female of *afrum* André shows modifications in structure that are surprisingly like those of *santschii*. Unlike *santschii*, however, *afrum* retains a worker caste. I suspect that the female of *afrum* may be a temporary social parasite. The two species presently recognized, which formerly constituted *Wheeleriella*, are as follows.

Monomorium santschii (Forel)

Wheeleria santschii Forel, 1905: 171. Holotype female (dealate), TUNISIA: Kairouan, 19.viii.1903 (*F. Santschi*) (MHN) [examined].

Wheeleria santschii Forel; Forel, 1906: 51. [Descriptions of female and male, and notes on biology.]

Wheeleriella santschii (Forel) Forel, 1907*c*: 145.

Wheeleriella adulatrix Santschi, 1913*b*: 229. Holotype female (dealate), TUNISIA: Kairouan, 22.x.1913 (*F. Santschi*) (NMB) [examined]. **Syn. n.**

Wheeleriella santschii st. *insidiosa* Santschi, 1926*b*: 233. Syntype females, males, TUNISIA: Cheri-chera, 25.x.1925 (*F. Santschi*) (NMB; MCZ) [examined]. **Syn. n.**

Wheeleriella santschii var. *rufescens* Santschi, 1926*b*: 233. Syntype females, males, TUNISIA: Kairouan (*F. Santschi*) (NMB) [examined]. **Syn. n.**

Monomorium santschii (Forel) Ettershank, 1966: 92.

Host: *Monomorium salomonis* (L.). Distribution: Tunisia.

Monomorium effractor nom. n.

Wheeleriella wroughtoni Forel, 1910*a*: 7. Syntype females, males, India: Poona, 24.v.1890, and 7.iv.1891 (*R. Wroughton*) (BMNH; MHN) [examined]. (Junior secondary homonym of *Monomorium wroughtoni* Forel, 1902: 209.)
Monomorium wroughtoni (Forel, 1910*a*) Ettershank, 1966: 93.

Host: *Monomorium indicum* Forel. Distribution: India.

Epixenus Emery (1908*a*).

Further to Brown & Wilson's (1957) extensive discussion of *Epixenus* and its subsequent synonymy with *Monomorium* it has become even more obvious that their conclusions were correct, and that *Epixenus* consisted of nothing more than a loose assemblage of *salomonis*-group females which happen to be apterous or ergatoid. The characters formerly invoked to differentiate *Epixenus* from *Monomorium* rested on the ergatogyny of these females and their supposed workerless parasitic lifeway, and on the observation that in at least the earlier described females the petiolar and postpetiolar nodes were broader and narrower than was 'normal' in *Monomorium*.

During this present survey of *salomonis*-group members numerous females have been examined, and the supposedly specialized form of petiole and postpetiole confirmed as being non-existent in reality, as was earlier pointed out by Brown & Wilson (1957). Members of *Monomorium* exhibit a range of petiolar and postpetiolar forms, the same shapes sometimes being independently derived in different species-groups and the range of node form within some groups being very variable. The *salomonis*-group is a case in point as the supposedly specialized nodes seen in the species which formerly made up *Epixenus* are in reality part of a continuous variation which spans the group, some but not all of the former *Epixenus* species merely being at the extreme end of the varietal range. One species originally described in *Epixenus*, *guineensis* Bernard, was incorrectly placed there because its author relied upon node shape. In this case the node shape was acquired by parallel development in a radically different small species-group confined to sub-Saharan Africa, see p. 425.

As for the apterous or ergatoid females supposedly characteristic of *Epixenus*, similar or less strongly ergatoid forms are also found in *venustum* (Smith), *opacior* Bolton, *minor* Stitz, *damarense* Forel, *dichroum* Forel, *rufulum* Stitz, *hesperium* Emery, *medinae* Forel and *pallidum* Donisthorpe of the *salomonis*-group. In all of these the wings have never been developed but in some the usual full complement of alitrunk sclerites is present, though reduced in size. In others the mesoscutum, scutellum and axillae are partially or wholly fused (Figs. 27–30). Such forms constitute stations in a continuous morphocline between the usual winged females of the *salomonis*-group and the ergatoid females which formerly made up *Epixenus* (Bolton, 1986*b*).

Concerning the supposed parasitic workerless lifeway of *Epixenus* species, this was based on speculation from the outset and the speculation was rendered dubious by Bernard's (1955) description and discussion of *algiricus* Bernard workers. The parasite hypothesis has recently been utterly discredited by Tohmé & Tohmé (1979) who showed that the ergatoid females are not parasites but are the usual reproductive forms of the workers with which they are associated. To replace the parasite hypothesis I suggested (Bolton, 1986*b*) that like *pharaonis* these species utilize autoparasitism followed by polygyny and colony fission as their means of dispersal.

The only disconcerting aspect of the Tohmé & Tohmé (1979) paper was their retention of the name *Epixenus*, despite the fact that their study destroyed one of the major characters invoked to isolate the genus. That they were unaware of Brown & Wilson's (1957) synonymy, or of Ettershank's reiteration of it, is apparent as both works are omitted from their references.

In summary then, *Epixenus* is a straight synonym of *Monomorium* and all its included species except *guineensis* are referable to the *salomonis*-group. The species in question are those dealt with by Brown & Wilson (1957), and the following.

Monomorium grassei (Tohmé & Tohmé) comb. n.

Epixenus grassei Tohmé & Tohmé, 1979: 1088, figs 1–4. Syntype workers, females, males, Lebanon: Turbol, central Bekaa, 23.x.1977 (*Tohmé & Tohmé*) (MNHN).

Monomorium syriacum (Tohmé & Tohmé) comb. n.

Epixenus syriaca Tohmé & Tohmé, 1979: 1100, fig. 7. Syntype workers, female, Syria: Markab, south of Banias, 10 m, 10.iv.1974 (*Tohmé & Tohmé*) (MNHN).

Monomorium libanicum (Tohmé & Tohmé) **comb. n.**

Epixenus libanicus Tohmé & Tohmé, 1979: 1103, fig. 8. Syntype workers, female, LEBANON: Mt Liban, Laklouk, 1200 m, 6.iv.1966 (*Tohmé & Tohmé*) (MNHN).

Paraphacota Santschi (1919*a*).

This genus was based on three males taken at light at Biskra in Algeria, which Santschi (1919*a*) described as *Paraphacota surcoufi*. He believed that *Paraphacota* was very close to 'subgenus *Xeromyrmex* Em., of which it is probably a parasitic derivative.' His only character differentiating *Paraphacota* from the *salomonis*-group of *Monomorium* (i.e., the old subgenus *Xeromyrmex*, in part) was the great elongation of the genital parameres in the former.

Later the same year Santschi (1919*c*) described *Paraphacota cabrerai* from the Canary Islands, and a couple of years after that he added a third form, *obscuripes* Santschi (1921*c*), also from the Canary Islands.

By the time of his review of some members of the *salomonis*-group, Santschi (1927) had realized that these males with elongate parameres were in fact referable to *Monomorium subopacum* or its closest relatives. He sank *obscuripes* as a straight synonym of *subopacum* and relegated *surcoufi* (the type-species of *Paraphacota*) and *cabrerai* to varietal status under *subopacum*. By doing this he effectively synonymized *Paraphacota* with *Monomorium*, by shifting all the contents of the former, including its type-species, to the latter, a different and senior genus. Remarkably, instead of acknowledging the synonymy, and perhaps in a misguided attempt to retain the name *Paraphacota*, he designated (Santschi, 1927: 245) a completely different species (*Phacota noualhieri* Emery) as a replacement type-species for *Paraphacota*!

Taxonomically this is both naive and unacceptable as the type-species of *Paraphacota* can only be *surcoufi* (by monotypy), and Santschi's (1927) redesignation is utterly invalid. Unfortunately Ettershank (1966) picked up this ridiculous redesignation and perpetuated the error, which was again repeated in Bolton (1973). The correct apellation and synonymy of *Paraphacota* is given in the synonymic synopsis of *Monomorium*, above. For discussion of *Phacota noualhieri*, now included in the *M. salomonis*-group, see p. 282.

Comparison of the male types of the various names formerly included in *Paraphacota* with the males of other *salomonis*-group species indicates that the Algerian *surcoufi* and Canary Islands *cabrerai* match the males of *Monomorium subopacum* from localities as far apart as Egypt and the Cape Verde Islands; these names are treated as direct synonyms of *subopacum* (p. 360). The holotype male of *obscuripes*, from the Canary Islands, also resembles *subopacum* males very closely indeed but has the appendages and genital parameres much darker. It is also treated here as a synonym of *subopacum* but more material of this form is required for study and its status may be changed when it is better known.

Wheeler (1927*a*) suspected that *cabrerai* may be the male of *medinae* (= *mystes*), a suggestion repeated by Espadaler (1982). To the present no males have been found in direct association with *medinae* so this remains merely a supposition in need of further investigation. If the male of *medinae*, or the other endemic Canary Island species *hesperium*, does have elongate narrow parameres like those of *subopacum* (which is also present in the Canary Islands) then I am more inclined to suspect *obscuripes* of being that male, as the male of *cabrerai* seems indistinguishable from that of *subopacum*.

Xenhyboma Santschi (1919*c*).

Santschi (1919*c*) described a strange ant species, *Xenhyboma mystes*, from a single female found at Teneriffe in the Canary Islands. He assumed that it was a parasitic form and stated that it was related to *Monomorium* and *Epixenus*; the latter now known to be the name earlier applied to a number of species of the *Monomorium salomonis*-group in which the females are apterous or ergatoid (see above).

The taxonomic history of *mystes* since then, and the speculations about its biology and identity, have been neatly summarized by Espadaler (1982), who has shown that *X. mystes* is in fact the normal reproductive female of the Canary Islands endemic species *Monomorium medinae* Forel, confirming the previous suggestion by Kutter (1972) that such was the case. Ettershank (1966) had earlier provisionally synonymized *Xenhyboma* under *Monomorium* but had given no discussion of his reasons for doing so. Espadaler's (1982) study conclusively proved the synonymy.

Espadaler (1982) also mentioned Wheeler's (1927*a*) suspicion that *mystes* may be the female of *Paraphacota cabrerai*, also described from Teneriffe and based on a single male specimen. I am inclined to disagree with this as the males formerly placed in the spurious genus *Paraphacota* all seem synonyms of *Monomorium subopacum*, another species fairly common in the Canary Islands and also very widespread indeed around the Mediterranean. This opinion is of course open to revision, but as males directly associated with *medinae* (= *mystes*) remain unknown speculation is all that is presently possible.

Thus *medinae* is yet another *salomonis*-group species which has developed an ergatoid female along

with, among those species where the female is known, *venustum*, *pallidum*, *opacior*, *rufulum*, *dichroum*, *damarense*, *minor*, *hesperium*, and those species formerly included in *Epixenus*. In the light of recent works by Bernard (1955), Tohmé & Tohmé (1979) and Espadaler (1982) the old tacit assumption that all these forms are socially parasitic, often without the slightest evidence that such was the case, must be discarded. A more likely means of colony spread in these species involves the development of autoparasitism followed by polygyny and colony fission (Bolton, 1986*b*). In this system the apterous or ergatoid females mate within the parent colony, or return to it immediately after mating outside. At some time after this the now polygynous nest undergoes fission, with some of the newly mated females leaving along with some workers to commence a new colony elsewhere.

In the *salomonis*-group such apterous or ergatoid females retain the basic characters of the group but the alitrunk becomes very specialized by reduction of the flight sclerites. In some the alitrunk retains most or all flight sclerites though in a somewhat reduced form and the wing-roots are sealed or overgrown with cuticle, or never developed. Wings and tegulae are of course lacking. From such forms more advanced modifications include the reduction in size of the mesoscutum so that the pronotum comes to constitute a part of the dorsal alitrunk, the fusion of the mesoscutum, scutellum and axillae into a single sclerite which may then be reduced in size, and the development of a saddle-shaped outline to the mesoscutum plus scutellum, which is depressed centrally in its outline when viewed in profile (Bolton, 1986*b*).

Another *salomonis*-group species originally described from the Canary Islands, *hesperium*, was regarded by Espadaler (1982) as possibly being a synonym of *medinae*. Workers of the two are indeed close, being separated primarily by the presence of fine reticulate-punctate sculpture on the meso- and metapleura in *medinae* and its absence in *hesperium*, where the sides of the alitrunk are free from sculpture and glassy smooth. Females of the two are, however, very different. Unfortunately workers apparently matching the holotype of *hesperium* are also found on the Cape Verde Islands but the apterous females associated with this series, figured by Bolton (1986*b*) as *hesperium*, appear different from the apterous females referred to *hesperium* and described by Espadaler & Agosti (1985) from the Canary Islands. Hence a third species appears to be involved and only a critical re-examination of the holotype worker of *hesperium*, in the presence of the *hesperium*-like workers from the Canary Islands and Cape Verde Islands series, may be able to solve the problem. Nevertheless, I am inclined to believe that Espadaler & Agosti (1985) have the female associated correctly and that the Cape Verde series (in BMNH) represents an undescribed species.

The two described species involved are as follows.

Monomorium medinae Forel

Monomorium medinae Forel, 1892*b*: 454. Holotype worker, Canary Islands: Teneriffe, Laguna (*Medina*) (MHN) [examined].

Xenhyboma mystes Santschi, 1919*c*: 405, fig. 2. Holotype female, Canary Islands: Teneriffe, Laguna, 10.iv.1918 (*A. Cabrera y Diaz*) (NMB) [examined]. [Synonymy by Espadaler, 1982: 112.]

Definitely associated male of the species remains unknown.

Monomorium hesperium Emery

Monomorium hesperium Emery, 1895*a*: 298, fig. 3. Holotype worker, Canary Islands: no loc. (*Alluaud*) (MCSN) [examined].

Female described by Espadaler & Agosti (1985), male remains unknown.

Xeromyrmex Emery (1915).

This subgenus of *Monomorium*, as defined by Emery (1915) with *salomonis* as type-species, was given no formal diagnosis except in the prototype key to subgenera which Emery compiled in that publication and later expanded (Emery, 1922). The separation of the subgenus depended on unsatisfactory characters relating to relative dimensions of antennal club segments and to number of antennal segments. This led Forel (1917) in his synopsis of formicid classification, to complain that subgenus *Xeromyrmex* was insufficiently defined. Despite this warning of the weakness of the system Emery (1922) expanded his key to include several more names and the key was reproduced, with some rearrangement, by Wheeler (1922). This repetition of the system somehow served to invest it with an apparent utility and stability which in truth was utterly lacking.

Santschi (1930*b*) was unhappy about the Emery-Wheeler classification based on club segments and he pointed out that *pharaonis* and its allies, as then understood, fell between the subgenera *Monomorium* (s.

str.) and *Xeromyrmex* as then defined. He did not resolve the problem and later (Santschi, 1936) was still using *Xeromyrmex* despite the fact that all the insecurity of the system was still present. The problem of defining *Xeromyrmex* was not resolved but rather was sidestepped, in that newly described species recognizably close in habitus to *salomonis* or its immediate allies were placed in *Xeromyrmex*. Others which did not have the habitus of *salomonis* were scattered in the remaining subgenera or had new subgenera erected to contain them.

Arnold (1944) criticized the use of relative dimensions of club segments to define the subgenera of *Monomorium* and proved his case by carrying out careful measurements on a number of species. He concluded that, 'the differences are in some cases imaginary, or alternatively, that Emery has placed some species in the wrong subgenera or that the subgenera cannot be defined with any exactitude.' It only remained for Ettershank (1966) formally to synonymize *Xeromyrmex* under *Monomorium* to bring the history of this subgeneric name to a close.

My interpretation of the history of *Xeromyrmex* is that initially Emery recognized *salomonis* and its immediate allies by habitus alone, and then cast about for characters to define the group and isolate it from other groups of *Monomorium*. Failing to find any obvious character or combination of characters to delimit the group he somehow ended up using the very vague and inaccurate system based on relative dimensions of antennal club segments, which did not work too well even on the relatively few species then known. But the system, once proposed, became self-perpetuating by means of its inclusion in the classical studies of Emery (1922) and Wheeler (1922). The system was criticized thereafter but nothing better was put foreward. Unfortunately the monomoriine fauna known in 1915–22 was only a fraction of that known today and, as time went by, species added to the various subgenera of *Monomorium* stretched the credibility of the system past breaking point, either by failing to fit the pre-existing categories, or by overlapping them and thus occluding the supposed differences.

The present concept of the *salomonis*-group (p. 329) is based on the core-species of the now defunct *Xeromyrmex*, with, however, a good number of exclusive and inclusive changes from the 1922 concept put foreward in the Emery-Wheeler joint classification. At present the *salomonis*-group includes those species immediately related to *salomonis*, plus the small complex of species surrounding *pharaonis*, and those forms once regarded, rightly or wrongly, as parasites belonging to the genera *Wheeleriella*, *Paraphacota*, *Xenhyboma* and *Epixenus*, which names are strictly synonyms of the *salomonis*-group within *Monomorium*. Excluded are the species now constituting the *setuliferum*-group (p. 365) and a number of other odd species previously wrongly included in this group.

Genus-level names applicable to the *Monomorium scabriceps*-group

Holcomyrmex Mayr (1878).

Originally described as a distinct genus and so treated by earlier authors such as Bingham (1903). Emery (1908*b*) recognized the former *Holcomyrmex* members as belonging to *Monomorium* and later the name was used as a subgenus within *Monomorium* by Forel (1917), Emery (1915, 1922) and Wheeler (1922). It continued as such until it was synonymized with *Monomorium* by Ettershank (1966).

During the late 1800s several species were added to the *scabriceps*-group, as *Holcomyrmex*, which are now regarded as members of the *destructor*-group or other related groups. The process of removing these species from the *scabriceps*-group had mostly been completed by the time of Emery's (1922) catalogue, but a couple of names wrongly included there by him are transferred elsewhere in this study (p. 321).

For separating the *scabriceps*-group from other groups of *Monomorium*, much emphasis was laid in the past on the structure of the antennae in the workers and males. In the former the funiculus was regarded as lacking an apical club (Fig. 31) and in the latter was described as having a short scape, globular first funicular segment and the remainder flagelliform (Fig. 26). Whilst the description of the male antenna is accurate that of the workers (and females) should be modified so that it is understood that the apical funicular segments gradually increase in size apically or the terminal 3–4 segments form a weak club. The antennal characters alone cannot be used to separate *Holcomyrmex* as the worker funiculus grades into the clavate form usually seen in *Monomorium* and the male antenna is indistinguishable from that seen in the *destructor*-group.

Despite this the presently recognized members of the group (p. 321) form, in the workers, a fairly distinctive collection of relatively large polymorphic species which range through the Oriental region and also occur in the Mediterranean Palaearctic and the sahelian zone of the Afrotropical region. All are granivorous and are characterized by their near-vertical slit-like or elliptical propodeal spiracles and the position of the petiolar spiracle, which is close to the midlength of the peduncle rather than at the level of the anterior margin of the node or within the body of the node. These features separate the *scabriceps*-group from most other *Monomorium* and I suspect may make this group the strongest candidate for

isolation as a separate genus. Unfortunately the known males remain indistinguishable from those of the *destructor*-group and in the workers all characters except the shape of the propodeal spiracle show intermediates or near-duplicates in members of the *destructor*-group.

That the *scabriceps*-group and the *destructor*-group are extremely closely related is very evident, but I can find no way of isolating the two together to form a genus-level taxon except for the form of the male, but even here males are known which apparently form morphological intermediates between the characteristic *salomonis*-group male and those of the *scabriceps*- and *destructor*-groups. Much of the distinctive habitus of the *scabriceps*-group stems from their adoption of a granivorous diet and they have convergently come to resemble, in general aspect, other granivorous taxa such as *Messor* Forel, *Pogonomyrmex* Mayr, and the *Tetramorium solidum*-group. Elsewhere within *Monomorium*, the granivorous *falcatum*-group and to a lesser extent the *rothsteini*-group of Australia also resemble the *scabriceps*-group in habitus but lack the propodeal spiracular form characteristic of the *scabriceps*-group. These Australian groups and the *scabriceps*-group are analysed as convergently similar rather than as divergent members of a single parent group.

For the present then, only the shape of the propodeal spiracle in the workers can be cited as an apomorphic character which will isolate the group from other *Monomorium* species. I consider this character to have significance only at species-group level and confirm Ettershank's (1966) synonymy of *Holcomyrmex* under *Monomorium*.

Trichomyrmex Mayr (1865).

Ettershank (1966) examined the holotype female of *Trichomyrmex rogeri* Mayr, the type-species and only member of the genus. He found it to be a member of the *scabriceps*-group, in the sense of his publication, which includes the *scabriceps*-group and *destructor*-group of the present study. A revision of the Oriental regional fauna of these groups will probably show *rogeri* as the senior synonym of a known species of the *scabriceps*-group, as constituted here, as Mayr (1865: 19) gives its TL as 11·0.

Genus-level names applicable to the *Monomorium destructor*-group.

Parholcomyrmex Emery (1915).

Parholcomyrmex, also misspelled as *Paraholcomyrmex* later in the same publication, was erected as a subgenus of *Monomorium* to contain those species previously regarded as *Holcomyrmex* but which had a relatively more strongly defined antennal club. In the publication Emery (1915) only nominated a type-species, *gracillimum* (now a synonym of *destructor*), but in his later catalogue Emery (1922) gave a good idea of the species which he had in mind when nominating this taxon.

Beside his type-species he included *destructor*, *dispar* (now a synonym of *oscaris*) and their synonyms, the then infraspecific names *mayri* and *robustior* which are now regarded as valid species within the group, and *santschianum*, which later became the type-species of *Isolcomyrmex*. The remaining names which he included, *australe*, *havilandi*, and *voeltzkowi*, are now referred to different species-groups (*salomonis*-group, *setuliferum*-group and *latinode*-group respectively). The subgenus as envisaged by Emery was not challenged until it was synonymized by Ettershank (1966).

This group of species, based on the direct relatives of *destructor* (= *gracillimum*) and excluding those noted above and those which must be excluded from Wheeler's (1922) Afrotropical catalogue, is here termed the *destructor*-group. In Ettershank (1966) species related to *destructor* were included in an expanded *scabriceps*-group, probably because their males are identical and very distinctive. However, specializations in the female castes differ consistently between the two groups and they are regarded here as separate, though they probably shared a common ancestor which may have looked something like the existing *M. santschianum* (see *Isolcomyrmex* below).

The characteristic form of male seen in the *destructor*-group and *scabriceps*-group (Fig. 26) is also found in *Isolcomyrmex*, and a male intermediate between this form and that typical of the *salomonis*-group (Fig. 25) is seen in *chobauti*, formerly type-species of *Equestrimessor*. Workers of the *destructor*-group show most affinity with those of the *scabriceps*-group (Figs 31–35, 41) but are also similar in many respects to the members of the *setuliferum*-group. Thus the *destructor*-group, even in its present restricted form, is not deserving of genus-level taxonomic status and Ettershank's (1966) synonymy is confirmed.

Isolcomyrmex Santschi (1917).

Added as a post-script to a paper on new ants from southern Africa, Santschi's (1917) proposal of *Isolcomyrmex* as a subgenus of *Monomorium* was an exercise in casual systematics which followed the philosophy that any slightly aberrant ant must be worth a generic or subgeneric name, even if the peculiarity is restricted to a single caste. He merely stated that the worker of *M. santschianum* (= *santschii*)

had monomorphic workers and a 4-segmented antennal club, and thus merited a special name, separate from *Parholcomyrmex* (the *destructor*-group). Santschi (1911) had already described the male of the species, which matches the form of male seen in the *destructor*- and *scabriceps*-groups, but this was overlooked at the time of erection of *Isolcomyrmex*.

In point of fact, the workers of *santschianum* show a remarkable combination of *destructor*-group and *scabriceps*-group characters. Santschi's emphasis on the monomorphic worker condition is irrelevant as the *destructor*-group species *emeryi* and *robustior* are also monomorphic. The presence of a 4-segmented club, though useful in diagnosis at species-level, is not of great significance either, as it occurs, though weakly developed, in some members of the *scabriceps*-group and even convergently in a couple of *salomonis*-group species.

As for the true position of *santschianum*, the very specialized and highly characteristic male firmly allies the species with both the *destructor*- and *scabriceps*-groups. However, a review of the worker characters implies that *santschianum* is a specialized member of the *destructor*-group as it has a circular propodeal spiracle rather than the elliptical or slit-like spiracle apomorphic in the *scabriceps*-group. In other respects it also fits the diagnosis of the *destructor*-group (p. 322) except for having tridentate mandibles (the minute offset basal denticle having disappeared), very large eyes and a 4-segmented antennal club. The position of the eyes, though not their size ($0.34 \times$ HW), and the club are duplicated in some members of the *scabriceps*-group.

The distribution of characters shown by *santschianum* can be interpreted as indicating either that it represents a specialized offshoot from close to the stem where the *destructor*-group and *scabriceps*-group diverged, or that it is a specialized *destructor*-group species convergent on the *scabriceps*-group in several characters. I suspect the former to be correct as, beside the characters mentioned above, *santschianum* workers have a clypeal structure similar to the *destructor*-group, short scapes (SI ca. 78), and a small petiolar spiracle which is situated close to the node.

When first proposed *Isolcomyrmex*, later variantly spelled *Isholcomyrmex* by Santschi (1936), contained only the type-species *santschianum*. Wheeler (1922) added the Malagasy species *shuckardi* Forel, which emphatically does not belong here. On the other hand a peculiar Indian species, *aberrans* Forel, until now placed in the *salomonis*-group, appears to be the closest known relative of *santschianum*, at least as far as the workers are concerned (the male of *aberrans* remains unknown).

Equestrimessor Santschi (1919*a*).

Santschi (1919*a*) separated two granivorous species of *Monomorium*, *chobauti* (Emery) and *lameerei* (Forel), as a subgenus *Equestrimessor*. Later Santschi (1936) pointed out that his original manuscript spelling of the name had been *Equessimessor* but that the spelling had been changed by the editor of the journal. He characterized *Equestrimessor* as being distinct from the subgenus *Xeromyrmex* (now mostly the *salomonis*-group) by the presence in *chobauti* and *lameerei* of a discoidal cell in the forewing (i.e. cross-vein *m-cu*, which closes the cell, is present; as in Figs 18, 19), the possession of a truncated clypeus by the workers, and the presence of a short antennal scape in the male. Both species were described originally in *Holcomyrmex*, which at that time covered both the *scabriceps*-group and the *destructor*-group. These were later treated (Emery, 1908*b*) as separate species-groups, but by the time of Emery's (1922) catalogue both species had found their way into the *salomonis*-group as it was then understood.

Although Santschi was correct to remove the two from the *salomonis*-group the erection of a separate subgenus to hold them was unnecessary as they fall neatly into the *destructor*-group, the core-species of which were at that time referred to as subgenus *Parholcomyrmex*. The male of *chobauti* is structurally close to those of the *destructor*- and *scabriceps*-groups, but the scape is not as short as is usually seen in these groups (Fig. 26), nor is the first funicular segment quite so globular. In this respect the male antennae fall morphologically between the form seen in the *destructor*-group and that characteristic of the *salomonis*-group (Fig. 25). As Santschi (1919*a*) pointed out, cross-vein *m-cu* is absent in alates of the *salomonis*-group (Fig. 22) so that there is no closed discoidal cell, but this vein is variously developed in the *destructor*-group and *scabriceps*-group. In some individuals of the latter *m-cu* may be present on one forewing and absent from the other (Figs 19, 21).

Turning to the worker of *chobauti*, it resembles nothing so much as a large (HW *ca* 0·96) monomorphic member of the *destructor*-group which has its clypeus more strongly truncated medially than is usual. This may well be correlated with the strictly granivorous diet of this species, as may the strong psammophore of very long ammochaete hairs which arises on the flat ventral surface of the head.

Genus-level names applicable to the *Monomorium fossulatum*-group.

Syllophopsis Santschi (1915).

Originally described as an Afrotropical subgenus of *Monomorium* and later elevated by Santschi (1921*b*)

to generic status, *Syllophopsis* has since been variously treated as a subgenus of *Monomorium* (Emery, 1922; Wheeler, 1922; Arnold, 1952) or as a valid genus (Santschi, 1935*b*; Ettershank, 1966). It is regarded here as a straight synonym of *Monomorium*, the former members of *Syllophopsis* being no more than the Afrotropical component of the *Monomorium fossulatum*-group which is very widespread in the Oriental and Indo-Australian regions.

Until the use of litter sampling techniques became relatively common, species referable to this group were considered very rare. However, the employment of such collecting methods in recent years has shown the Afrotropical members of the group to be much more numerous than was previously suspected.

Ettershank (1966) retained *Syllophopsis* as a good genus but did not see any of the African material which had been referred to it. If he had it is a reasonable assumption that he would quickly have discerned the relationship between *talpa*, the commonest species of the group in the Indo-Australian region, and the African forms, as he had synonymized one genus-level name with *talpa* in his study (*Ireneidris*, below).

At first glance species of *Monomorium* belonging to this group appear quite distinct (Figs 93, 94) as the workers have much reduced eyes, usually down to a single ommatidium, a very narrow posteromedian portion of the clypeus, and a large and strongly differentiated antennal club. The development of these characters is, however, paralleled to varying degrees elsewhere in *Monomorium*, especially in the *hanneli*-group (Figs 97, 98, and p. 425), and a species intermediate between those forms which formerly constituted *Syllophopsis* and the main mass of the genus *Monomorium* occurs in Madagascar. For further discussion see p. 420.

Ireneidris Donisthorpe (1943*a*).

Donisthorpe described this genus for a single species, *I. myops*, from New Guinea. Ettershank (1966) recognized that *myops* was an absolute junior synonym of the widely distributed *M. talpa*, and *Ireneidris* fell into the synonymy of *Monomorium*. *M. talpa* is the commonest species of the *fossulatum*-group outside the Afrotropical region.

Genus-level names applicable to the *Monomorium monomorium*-group.

Epoecus Emery (1893*a*).

The taxonomic history of this genus-level name has been discussed by Creighton (1950) who also pointed out that our knowledge of the life history of its single species, *pergandei* Emery, is unsatisfactory and incomplete. Much of this stems from the fact that *pergandei* remains known only from the type-series, which was collected in a nest of *Monomorium minimum* (Buckley) near Washington, D.C., U.S.A. *M. pergandei* is certainly a workerless inquiline, and by modern concepts is plainly a *Monomorium* species belonging to, or immediately derived from, the *M. minimum*-complex of the Nearctic region (referred to as the *minimum*-group by DuBois, 1986). *Epoecus* was synonymized with *Monomorium* by Ettershank (1966), and a lectotype was designated by DuBois (1981) who also confirmed its position in *Monomorium*.

Morphologically *pergandei* shows some interesting adaptations, not the least of which is the marked similarity of habitus between the females and males, though why the sexes of this inquiline should be so alike is not known. Both sexes may have 11 or 12 antennal segments (each count was recorded from each sex in the type-series), and in both sexes the mesoscutum bulges anteriorly and overhangs the pronotum, a trait paralleled by a similar development of the mesoscutum in the workerless inquilines *M. santschii* and *effractor* of the *salomonis*-group.

Like the other workerless inquilines of the *minimum*-complex, *talbotae* DuBois and *inquilinum* DuBois, and like *hospitum* Viehmeyer from outside the complex, *pergandei* shows reduced dentition and palp segmentation in the female, as follows.

Female of:	PF	teeth	antennal segments	host species
minimum	2,2	4	12	free living
pergandei	1,2	3	11–12	*minimum*
inquilinum	1,2	2	12	*cyaneum*
talbotae	1,1	2	12	*minimum*
hospitum	unknown	1	12	*floricola*

Where males are known of these inquiline species they show a reduction in antennal segments from 13 to 11 or 12, have PF as the conspecific female, and have the dental count reduced to 1 or 2 teeth.

The evidence that *pergandei* parallels developments seen in other inquilines from elsewhere in *Monomorium*, and shows characters which form part of a sequence from free-living *Monomorium* to morphologically even more extreme socially parasitic species, obviates the need for a separate genus to

hold *pergandei*, and Ettershank's (1966) synonymy is confirmed as valid. The present status of *pergandei* is as follows.

Monomorium pergandei (Emery)

Epoecus pergandei Emery, 1893*a*: cclxxvi. Lectotype female (designated by Dubois, 1981: 36) and paralectotype females and males, U.S.A.: Washington, D.C., in nest of *Monomorium minimum (T. Pergande)* (USNM, MCZ, MCSN) [MCSN and MCZ material examined].
Monomorium pergandei (Emery) Ettershank, 1966: 89; DuBois, 1986: 113.

Corynomyrmex Viehmeyer (1916).

Viehmeyer (1916) erected a separate subgenus of *Monomorium*, *Corynomyrmex*, for a single species (*hospitum*) based on a series of 4 females and 2 males taken from a nest of the common tramp species *M. floricola*, in Singapore.

The dull yellowish female of this apparently workerless inquiline is small, about the same size as the *floricola* worker and distinctly smaller than the reproductive female of *floricola*. In most aspects of its morphology the *hospitum* female is unexceptional but the mandibles are highly specialized, showing a reduction in dentition which is paralleled in some other inquilines (see *Epoecus*, above). In *hospitum* the masticatory margin of the female mandible consists of a straight edentate proximal half and a massively extended distal half which projects as a relatively large single sharp tooth. The inner margin of this large tooth shows minute crenellations which appear to be the vestigial remains of 2 preapical teeth. On each side this enlarged tooth projects far across beyond the midline of the clypeus, even projecting beyond the blunt prominence of the median portion of the clypeus on the opposite side from its insertion. Apart from the mandible the head is normal for *Monomorium*.

The female alitrunk in dorsal view is very narrow, much narrower than the head. The mesoscutum is somewhat reduced but parapsidal grooves are still present. Wing remnants illustrate that the females are alate when virgin.

From the original description the male, which I have not seen, seems unremarkable except for the fact that the antennal segmentation is reduced to 12, a character shared with other inquilines in this group. Only a single species was ever referred to *Corynomyrmex*, and it is known only from the type-series. Ettershank's (1966) provisional synonymy of *Corynomyrmex* under *Monomorium* is confirmed here.

Monomorium hospitum Viehmeyer

Monomorium (Corynomyrmex) hospitum Viehmeyer, 1916: 133. Syntype females and males, SINGAPORE: no. 13: 71 (*H. Overbeck*) (MNHU) [female examined].
Monomorium hospitum Viehmeyer; Ettershank, 1966: 89.

Lampromyrmex Mayr (1868), and *Mitara* Emery (1913).

Lampromyrmex was defined to hold a single small species from the Baltic Amber, which had only 11 antennal segments. This species, originally described as *L. gracillimus*, was based on 4 worker specimens, each embedded in a separate piece of amber. When Wheeler (1915) examined this material, and much more, he concluded that *Lampromyrmex* was a synonym of *Monomorium*. At the same time he pointed out that the name of the sole *Lampromyrmex* species, *gracillimus*, became a junior homonym when transferred to *Monomorium*, and proposed *mayrianum* as a replacement.

A couple of years before Wheeler's (1915) study Emery (1913) had suggested a subgenus *Mitara*, in which he placed all the Old World species of *Monomorium* which had 11-segmented antennae. Later he realized (Emery, 1922) that this subgeneric name was unnecessary as its diagnostic characters were identical to those given earlier for *Lampromyrmex*. He therefore synonymized *Mitara* under *Lampromyrmex* but continued to regard the latter as a subgenus of *Monomorium*, rather than as a synonym of it.

Lampromyrmex was resynonymized under *Monomorium* by Ettershank (1966), who pointed out that the antennae in *Monomorium* workers may have 12, 11, or 10 segments. The present study indicates that the reduction of antennomere count from 12 to 11 is not synapomorphic in all species-level taxa of this group which show the character. It has evolved independently in several discrete lineages, certainly three times and possibly four times in the Afrotropical *monomorium*-group fauna alone. Thus, as the presence of 11-segmented antennae does not delineate a holophyletic taxon at genus or subgenus level Wheeler's (1915) and Ettershank's (1966) synonymies are confirmed.

Endemic Afrotropical species-complexes within the *M. monomorium*-group have antennal segment counts distributed as follows in the worker.

	Number of species with 12-segmented antennae.	Number of species with 11-segmented antennae.
bequaerti-complex	–	3
strangulatum-complex	4	1
malatu-complex	4	1
boerorum-complex	14	7
all other complexes	all	none

Australasian genus-level names formerly associated with *Chelaner*.

In his review of *Monomorium* and its relatives Ettershank (1966) elevated the former subgenus *Chelaner* to generic rank, including *Notomyrmex*, *Schizopelta*, and *Protholcomyrmex* as junior synonyms. Whilst agreeing with his synonymy of these names I cannot find any character or combination of characters which will now serve to maintain *Chelaner* as a genus separate from *Monomorium*.

Of the diagnostic characters listed by Ettershank (1966) as separating *Chelaner* from *Monomorium* in female and worker castes, only the following have any apparent validity.

Monomorium	*Chelaner*
PF 2,2 or 1,2.	PF 2,3 or rarely 2,2.
Propodeal spiracle not vestibulate.	Propodeal spiracle vestibulate.

Other characters which he notes are either the same in both (structure of clypeus, antennae, pedunculate petiole), or are part of the genus-group diagnosis (presence of median clypeal seta, open radial cell in forewing), or are known to occur in both (variation in propodeal shape).

The palp formula shows overlap even though the count of 2,2 is vastly predominant in *Monomorium* whilst that of 2,3 occurs most commonly in *Chelaner*. The PF count and its gradual diminution, although useful in places to help diagnose species-groups, forms a morphoclinal reduction through the genus as a whole, and PF counts of 5,3; 3,3; and 1,1 are also known in *Monomorium* in its broad sense.

As for the vestibulate nature of the propodeal spiracle in *Chelaner* species, the character seems very variably developed and is by no means consistent. In some species no vestibule is discernible and the character has no value as a generic determinant.

Turning to the males, the only significant character noted by Ettershank (1966) was that in *Chelaner* the mesoscutum was said to have 'parapsidal furrows faint to distinct; notauli heavily impressed to faint,' whilst in *Monomorium* 'notauli and parapsidal furrows not developed.' In most *Monomorium* males the parapsidal grooves are faint to distinct and in some the notauli are vestigially present (although usually absent). In fact the degree of development of the notauli shows considerable overlap between the two and only the few *Chelaner* species with relatively strongly developed notauli are not duplicated in any known *Monomorium*. Thus these character states are gradient and not useful in separating genera.

As none of the previously invoked characters can be used to separate *Chelaner* from *Monomorium*, and as no new consistent characters have been discovered, *Chelaner* (and its junior synonyms decided by Ettershank (1966)) has been placed in the synonymy of *Monomorium*.

Whilst I cannot present a review of species-groups of the Australasian fauna formerly constituting *Chelaner*, I can point out that three fairly distinctive aggregations of species seem discernible. It is obvious that Australia and its nearby islands exhibit a remarkable local radiation of *Monomorium* and possess a large number of fascinatingly adapted species which are not found elsewhere in the world, although a few are convergently like some extralimital groups from the Oriental and Indo-Australian regions. The three groups outlined below are only vaguely defined and in great need of study. I am convinced that a detailed investigation of the Australasian fauna will allow the diagnosis of numerous small specialized species-groups of *Monomorium* which at present are concealed within a great mass of undescribed species and remain unrecognized. Such a study may also show that the few species presently constituting the weak southern Neotropical genus *Nothidris* are really nothing more than an offshoot of this complex Australasian fauna.

The *falcatum*-group represents a number of specialized granivores in which the head is disproportionately large. The mandibles have 4 teeth and the PF is 2,2. The anterior clypeal margin has an extensive median emargination which is flanked by a pair of broad lobes or more usually teeth. Frequently a second pair of teeth occurs lateral to the median pair. The petiolar spiracle is at or close to the midlength of the peduncle.

M. rothsteini and its allies, formerly constituting the extremely poorly defined subgenus *Protholcomyrmex*, represents a distinct group (*rothsteini-group*) in which the mandibles have 3 teeth and the PF is 2,2. The median portion of the clypeus is reduced and not prominent, lacking teeth at the carinal apices and

without laterally situated teeth. The clypeal anterior margin is broadly but shallowly concave medially. The petiole node is high and the spiracle situated at the node.

Members of the *falcatum*- and *rothsteini*-groups show remarkable convergence on the non-Australian members of the *scabriceps*- and *destructor*-groups respectively. Both Australian groups, however, appear to lack the very specialized small males seen in the other groups. Apart from this *falcatum*-group workers lack the slit-like propodeal spiracle seen in the *scabriceps*-group, do not have a much reduced fourth (basal) mandibular tooth, lack strongly developed divergent or out-curved clypeal carinae, have the median portion of the clypeus prominent and have a distinct antennal club. Members of the *rothsteini*-group differ from the *destructor*-group as the former always has three mandibular teeth and has eyes situated at or even slightly behind the midlength of the sides of the head.

The large mass of species remaining is here termed the *forcipatum*-group, but this will certainly be divided by anyone revising the fauna. In these the mandibles usually have 5 teeth and are generally smooth. A few species show only 4 teeth and a few have the mandibular blades sculptured. Exceptionally a series of workers from some species may show both 4 and 5 teeth. Based on *in situ* counts the PF is overwhelmingly 2,3 though a few may be reduced to 2,2. The clypeus is bicarinate and often the carinae terminate in projecting denticles or teeth.

Other characters showing notable variation include the position of the eyes, usually close to or at the midlength but sometimes shifted forwards. The promesonotum is usually convex but in some it becomes flattened or the pronotum and mesonotum may be separated by an impression. The metanotal groove is usually conspicuous, but is obliterated in several species and only feebly developed in many; metanotal cross-ribs are often obliterated on the dorsum, or are very feeble. In several strange species the propodeal spiracle is relatively low down on the side and in others the petiolar peduncle is very elongate. Position of the petiolar spiracle varies considerably, as does the shape of the petiole node, at one extreme being thickly nodiform and at the other flattened and almost scale-like. The work required to bring order to this amazingly varied mass of species will be hard, but it will also be extremely interesting and very rewarding.

The Afrotropical fauna of *Monomorium*

145 currently valid species of *Monomorium* are recognized from the Afrotropical zoogeographical region. The species fall into 8 groups, as follows.

Species-group	Number of species
M. monomorium-group	69
M. salomonis-group	48
M. setuliferum-group	8
M. fossulatum-group	7
M. destructor-group	6
M. hanneli-group	5
M. scabriceps-group	1
M. latinode-group	1

Of the above only the *setuliferum*- and *hanneli*-groups are not found outside sub-Saharan Africa. The region is the main area of speciation of the *monomorium*- and *salomonis*-groups, which together represent over 80% of the fauna. Extralimital species of both these groups are widely distributed in other zoogeographical regions but, except as an introduction, the *salomonis*-group is apparently absent from the New World, the Indo-Australian region, and Australasia. Of the remainder the *destructor*- and *fossulatum*-groups are primarily African but have species represented outside the region, whilst the *scabriceps*-group is mainly Oriental but has one Sahelian species. The *latinode*-group is represented only by *latinode*, a tramp-species widely distributed around the Indian Ocean. Its affinities are not clear but appear to lie with the Australasian fauna of *Monomorium*.

All eight species-groups dealt with in detail here are defined on a world-wide basis, but their constituent species are fully revized only for the Afrotropical region. Other species-groups, those not represented in Africa, have been examined for comparative purposes and to render the species-group definitions formulated here as accurate as possible. These entirely extralimital groups, of which there are several in Australia, Madagascar, the Oriental and Indo-Australian regions, have not been formally defined here as the limits of many remain vague and must await detailed taxonomic studies of the regional faunas involved.

Recent ecological studies by Alan Marsh in Namibia have unearthed a large and previously almost unknown fauna of *Monomorium*. Of the 13 species which he found only four had been described. In a

paper on pitfall trapping efficiency Marsh (1984) lists three of these species by code-letters, which are now identified as follows. Marsh sp. A = *viator*, sp. B = *vatranum*, sp. C = *alamarum*. Others found in the same survey but not mentioned in the publication include *damarense*, *drapenum*, *esharre*, *katir*, *kitectum*, *mantazenum*, *marshi*, *mictilis*, *nirvanum*, and *rufulum*. All these deserticolous forms belong to the *salomonis*-group except for *alamarum* (*setuliferum*-group), and *mictilis* and *katir* (*monomorium*-group). There is little doubt that intensive collecting in other parts of the continent will yield similar increases in the number of known species, and I suspect that the Afrotropical fauna of this large and interesting genus is still only fractionally known.

Key to Afrotropical species-groups (workers)

1 Mandible with 5 teeth. PF 3,3 (Figs 99, 100) ..... ***latinode*-group (p. 429)**
— Mandible with 3-4 teeth. PF 2,2 or 1,2 2
2 Mandibles sculptured, longitudinally striate to rugose or uniformly granular 3
— Mandibles unsculptured except for hair-pits, smooth and shining 6
3 Propodeal spiracle an ellipse or short slit, its orientation vertical or nearly so (Fig. 33). Antennal club not strongly differentiated (Fig. 31). Polymorphic species with strongly bidentate anterior clypeal margin (Figs 31, 32) ..... ***scabriceps*-group (p. 320)**
— Propodeal spiracle circular to subcircular. Antennal club strongly defined. Monomorphic or polymorphic species but if the latter then anterior clypeal margin lacking teeth 4
4 Propodeal dorsum transversely striate to costulate, even if only faintly so
***destructor*-group (part; p. 322)**
— Propodeal dorsum smooth or variously sculptured but never transversely striate or costulate 5
5 Eyes situated in front of midlength of sides. In profile the eyes reniform or drawn out anteroventrally into a lobe or point (Figs 57–59). Mandibles with 3 or 4 teeth, if 4 then the basalmost is reduced to a minute offset denticle ..... ***setuliferum*-group (part; p. 365)**
— Eyes situated at or very close to the midlength of the sides (Figs 42–44, 51–53). In profile the eyes not reniform nor drawn out anteroventrally into a lobe or point (Figs 36–38, 45–47, 50, 55, 56). Mandibles with 4 teeth, only extremely rarely the basalmost tooth reduced
***salomonis-group* (part; p. 329)**
6 Eyes minute, reduced to a single ommatidium or with 2 ommatidia at most (Figs 93, 94)
***fossulatum*-group (p. 420)**
— Eyes larger, distinctly with more than 2 ommatidia 7
7 Frontal lobes closely approximated, the strip of clypeus running between them narrower or only fractionally wider than either of the frontal lobes. Propodeum angular to bidentate in profile (Figs 97, 98) ..... ***hanneli*-group (p. 425)**
— Frontal lobes farther apart, the strip of clypeus running between them broader, usually conspicuously broader, than either of the frontal lobes. Propodeum rounded 8
8 Propodeal dorsum transversely striate or costulate, even if only faintly so
***destructor*-group (part; p. 322)**
— Propodeal dorsum smooth, reticulate-punctate or sometimes otherwise sculptured, never transversely striate or costulate 9
9 Eyes reniform in profile (Fig. 57) ..... ***setuliferum*-group (part; p. 365)**
— Eyes not reniform in profile 10
10 Antennae with 12 segments. Dorsal alitrunk without standing hairs of any description
***salomonis*-group (part; p. 329)**
— Antennae with 11 or 12 segments. If the latter then dorsal alitrunk with standing hairs present at least at the pronotal humeri ..... ***monomorium*-group (p. 371)**

Synonymic list of Afrotropical species

***scabriceps*-group**
abyssinicum (Forel)
***destructor*-group**
destructor (Jerdon)
ominosa Gerstäcker
atomaria Gerstäcker
basalis Smith
gracillima Smith **syn. n.**
vexator Smith

emeryi Mayr
epinotale Santschi
mayri Forel **stat. n.**
destructor r. *gracillimum* var. *karawajewi* Forel (unavailable)
oscaris Forel
dispar Emery **syn. n.**
solleri Forel **syn. n.**
destructor subsp. *kalahariense* Forel **syn. n.**
destructor subsp. *kalahariense* var. *despecta* Forel (unavailable)
amblyops r. *bulawayense* Forel (homonym)
amblyops r. *prossae* Forel (replacement name) **syn. n.**
robustior Forel **stat. n.**
***salomonis*-group**
afrum André
afrum var. *asmarensis* Forel **syn. n.**
afrum var. *fultor* Forel **syn. n.**
albopilosum Emery
albopilosum var. *thales* Forel **syn. n.**
albopilosum st. *paucipilosa* Santschi **syn. n.**
albopilosum var. *clarithorax* Santschi **syn. n.**
albopilosum subsp. *fingo* Arnold **syn. n.**
anceps Emery **stat. n.**
areniphilum Santschi
salomonis var. *pullula* Santschi **syn. n.** (provisional)
salomonis var. *lepineyi* Santschi **syn. n.** (provisional)
australe Emery
subopacum r. *australe* var. *laeviceps* Emery (unavailable)
bicolor Emery
bicolor var. *coerulescens* Santschi
bicolor var. *rufibasis* Santschi **syn. n.**
bicolor var. *rufobasalis* Santschi (misspelling)
bicolor var. *uelense* Santschi **syn. n.**
bicolor var. *uluense* Santschi (misspelling)
bicolor var. *aequatoriale* Santschi **syn. n.**
bicolor var. *tropicale* Santschi **syn. n.**
carbo Forel **stat. n.**
dakarense Santschi **stat. n.**
damarense Forel **stat. n.**
salomonis var. *unicolor* Stitz **syn. n.**
delagoense Forel
salomonis r. *delagoense* var. *grahamstownensis* Forel (unavailable)
delagoense var. *lacrymans* Arnold **syn. n.**
dictator Santschi **stat. n.**
bicolor st. *personatum* var. *impuriceps* Santschi (unavailable)
disertum Forel **stat. n.**
termitarium st. *disertum* var. *petulans* Santschi (unavailable)
***drapenum* sp. n.**
***esharre* sp. n.**
excelsior Arnold **stat. n.**
speculiceps Santschi **syn. n.**
fridae Forel **stat. n.**
herero Forel **stat. n.**
hirsutum Forel **stat. n.**
ilgii Forel
junodi Forel **stat. n.**
delagoense var. *pretoriensis* Arnold **syn. n.**
***kitectum* sp. n.**
***mantazenum* sp. n.**
***marshi* sp. n.**

mediocre Santschi
micropacum **sp. n.**
minor Stitz **stat. n.**
nirvanum **sp. n.**
ocellatum Arnold
opacior **sp. n.**
salomonis r. *junodi* var. *opacior* Forel (unavailable)
delagoense st. *junodi* var. *serenum* Santschi (unavailable)
opacum Forel
ophthalmicum Forel
orangiae Arnold
osiridis Santschi
parvinode Forel **stat. n.**
personatum Santschi **stat. n.**
bicolor st. *personatum* var. *bimaculatum* Santschi (unavailable)
bicolor st. *personatum* var. *bimaculatoides* Ettershank (unnecessary replacement name)
pharaonis (L.)
antiguensis F.
domestica Shuckard
minuta Jerdon
vastator Smith
fragilis Smith
contigua Smith
rabirium **sp. n.**
rufulum Stitz **stat. n.**
monardi Santschi **syn. n.**
senegalense Roger (nomen dubium)
subdentatum Forel
subopacum (Smith)
glyciphila Smith **syn. n.**
mediterraneum Mayr
salomonis st. *subopacum* var. *senegalensis* Santschi (unavailable)
surcoufi Santschi **syn. n.**
cabrerai Santschi **syn. n.**
salomonis st. *subopacum* var. *liberta* Santschi (unavailable)
cabrerae [sic] st. *obscuripes* Santschi
salomonis subsp. *subopaca* var. *claveaui* Emery (unnecessary replacement name)
salomonis subsp. *subopacum* var. *santschiellum* Wheeler (unnecessary replacement name)
subopacum subsp. *italica* Baroni Urbani
sutu **sp. n.**
tchelichofi Forel
termitarium Forel **stat. n.**
vatranum **sp. n.**
viator Santschi
westi **sp. n.**
willowmorense **sp. n.**
salomonis r. *herrero* [sic] var. *willowmorensis* Forel (unavailable)
salomonis r. *herrero* [sic] var. *belli* Forel (unavailable)
zulu Santschi
setuliferum**-group**
alamarum **sp. n.**
ebangaense Santschi **stat. n.**
nyasae Arnold **syn. n.**
hannonis Santschi
havilandi Forel
distinctum Arnold **syn. n.**
distinctum var. *leviceps* Arnold **syn. n.**
macrops Arnold **stat. n.**
notulum Forel **stat. n.**

setuliferum var. *dolichops* Santschi **syn. n.**
setuliferum var. *latior* Santschi **syn. n.**
setuliferum Forel
xanthognathum Arnold
***monomorium*-group**
affabile Santschi
africanum Forel (nomen nudum)
altinode Santschi
altinode var. *bondroiti* Santschi **syn. n.**
angustinode Forel
arboreum Weber **stat. n.**
arnoldi Forel
***balathir* sp. n.**
bequaerti Forel
bevisi Arnold
***binatu* sp. n.**
boerorum Forel **stat. n.**
borlei Santschi **stat. n.**
braunsi Mayr
captator Santschi
crawleyi Santschi
***disoriente* sp. n.**
***dolatu* sp. n.**
***draxocum* sp. n.**
egens Forel
jucundum Santschi **syn. n.**
longiusculum Santschi **syn. n.**
excensurae Forel **stat. n.**
exchao Santschi
exiguum Forel
exiguum var. *bulawayensis* Forel **syn. n.**
faurei Santschi **syn. n.** (provisional)
exiguum r. *flavescens* Forel **syn. n.** (provisional)
fasciatum Santschi (nomen dubium)
fastidium sp. n.
firmum Santschi
floricola (Jerdon)
poecilum Roger
cinnabari Roger
specularis Mayr
impressum Smith **syn. n.**
angusticlava Donisthorpe **syn. n.**
***fugelanum* sp. n.**
gabrielense Forel **stat. n.**
guillarmodi Arnold
***holothir* sp. n.**
inquietum Santschi
***iyenasu* sp. n.**
***katir* sp. n.**
***kelapre* sp. n.**
kineti Weber **stat. n.**
lene Santschi
leopoldinum Forel **stat. n.**
explorator Santschi **syn. n.**
aequum Santschi **syn. n.**
estherae Weber **syn. n.**
lubricum Arnold
***malatu* nom. n.**
altinode Santschi (homonym)

***manir* sp. n.**
***mavide* sp. n.**
mictilis Forel **stat. n.**
exiguum st. *mictile* var. *sudanicum* Santschi (unavailable)
minutissimum Santschi **syn. n.** (provisional)
mirandum Arnold
musicum Forel
***noxitum* sp. n.**
nuptualis Forel **stat. n.**
occidentale Bernard
pacis Forel (nomen dubium)
pallidipes Forel **stat. n.**
***paternum* sp. n.**
oscaris r. *springvalense* var. *paterna* Forel (unavailable)
pulchrum Santschi
***rastractum* sp. n.**
rhopalocerum Emery
minutum subsp. *hottentota* Emery **syn. n.** (provisional)
leimbachi Forel **syn. n.**
rosae Santschi
cotterelli Donisthorpe **syn. n.**
rotundatum Santschi
schultzei Forel
shilohense Forel **stat. n.**
***spectrum* sp. n.**
speluncarum Santschi **stat. n.**
springvalense Forel
***sryetum* sp. n.**
strangulatum Santschi
***symmotu* sp. n.**
tablense Santschi **stat. n.**
***taedium* sp. n.**
***tanysum* sp. n.**
***torvicte* sp. n.**
***trake* sp. n.**
***tynsorum* sp. n.**
vaguum Santschi
***vecte* sp. n.**
***vonatu* sp. n.**
***fossulatum*-group**
cryptobium (Santschi) **comb. n.**
elgonense (Santschi) **comb. n.**
jonesi Arnold
arnoldi Santschi (homonym)
***malamixtum* sp. n.**
modestum Santschi
modestum var. *boerorum* Santschi (homonym)
modestum var. *transwaalensis* Emery (first replacement name) **syn. n.**
modestum var. *smutsi* Wheeler (second replacement name) **syn. n.**
***sersalatum* sp. n.**
***thrascoleptum* sp. n.**
***hanneli*-group**
guineense (Bernard)
hanneli Forel
moestum Santschi **syn. n.**
***invidium* sp. n.**
***jacksoni* sp. n.**
***valtinum* sp. n.**
***latinode*-group**

latinode Mayr
latinode var. *bruneum* Emery **syn. n.**
voeltzkowi Forel **syn. n.**

Key to Afrotropical species (workers)

Notes. The nomina dubia *fasciatum*, *pacis*, and *senegalense* are omitted from the key. Density and distribution of pilosity are important at several points in the key; old or abraded specimens must be treated with caution.

1 Antennae with 12 segments 2
— Antennae with 11 segments 145
2 Mandibles sculptured; either longitudinally rugose, or striate-rugulose, or costulate, or having a granular mat with superimposed fine striae over most or all of the mandible; the sculpture usually very conspicuous, the mandibles never smooth 3
— Mandibles unsculptured; either entirely smooth and highly polished, or smooth with scattered hair-pits, or at most with 1–2 minute striae at the extreme base; mandibles never with extensive conspicuous sculpture as described above 66
3 With the head in full-face view the cephalic dorsum from the level of the midlength of the eyes to the occipital margin with surface sculpture present other than small separated hair-pits. The sculpture may be striate, reticulate-punctate, shagreened, granular, or a combination of these; or the surface may have only feeble to vestigial superficial reticular patterning, but the surface is never entirely smooth and featureless except for hair-pits 4
— With the head in full-face view the cephalic dorsum from the level of the midlength of the eyes to the occipital margin without surface sculpture present, the entire surface smooth and featureless except for scattered hair-pits; very rarely a few fine transverse rugulae may occur at the occipital margin itself 59
4 Promesonotal dorsum with standing hairs present, at least a single pair at the pronotal humeri 5
— Promesonotal dorsum without standing hairs of any description 17
5 Propodeal dorsum with numerous standing hairs, obviously more than a single pair 6
— Propodeal dorsum without standing hairs or sometimes with a single pair at most 10
6 Basal (fourth) tooth of mandible only slightly smaller than third tooth. Scapes longer and head relatively long and narrow, SI 99–121, CI 73–83 7
— Basal (fourth) tooth of mandible reduced to a minute denticle which is only a fraction the size of the third tooth. Scapes shorter and head relatively short and broad, SI 63–88, CI 85–95 8
7 Head, alitrunk, petiole, postpetiole and appendages bright orange to orange-yellow, the gaster dark brown to blackish, the two colours strongly contrasting. CI 81–83, SI 99–103; maximum diameter of eye 0·19–0·21 × HW. (Ethiopia) ..... ***hirsutum*** (p. 345)
— Entire body more or less uniformly coloured brown to blackish, sometimes gaster darker in shade but without strongly contrasting areas of colour as above. CI 73–78, SI 110–120; maximum diameter of eye 0·22–0·25 × HW (Figs 38, 44). (Malawi, Zimbabwe, South Africa) ..... ***albopilosum*** (p. 335)
8 Dorsum of head and alitrunk entirely reticulate-punctate, without trace of striate or rugulose sculpture. First gastral tergite reticulate-punctate on basal one-third to one-half. Eyes weakly reniform in profile, their anterior margins drawn out into anteroventrally directed points. (Congo) ..... ***hannonis*** (p. 368)
— Dorsum of head, alitrunk or both with striate or rugulose sculpture present at least in part, or partially smooth; not evenly reticulate-punctate everywhere. First gastral tergite smooth basally except for hair-pits. Eyes oval in profile 9
9 Dorsal surfaces of head and alitrunk all evenly coarsely sculptured, the propodeum not more strongly sculptured than the head and promesonotum. Body colour light brown to blackish brown. (Malawi, Botswana, Zimbabwe, Mozambique, South Africa) ..... ***emeryi*** (p. 325)
— Dorsal surfaces of head and alitrunk not evenly coarsely sculptured, the propodeum more strongly sculptured than the head and promesonotum, the latter usually with extensive smooth areas; cephalic sculpture very faint. Body colour yellow. (Ghana, Nigeria, Ethiopia, Uganda, Zaire, Tanzania, Zimbabwe, Botswana, South Africa) ..... ***oscaris*** (part; p. 326)
10 Sculpture of promesonotal dorsum virtually effaced, leaving the surface smooth and with faint to vestigial superficial reticular patterning only 11
— Sculpture of promesonotal dorsum consisting of dense reticulate-punctation or of strong and conspicuous reticulation, the sculpture always distinct 12

11 Yellow species with HW < 0·65, SI 102–105; eyes with maximum diameter 0·33 × HW. (Ethiopia) ..... ***ilgii*** (p. 346)

— Glossy dark brown species with HW > 0·75, SI 114–122; eyes with maximum diameter 0·22–0·25 × HW. (South Africa) ..... ***excelsior*** (p. 344)

12 Dorsum of head from level of midlength of eyes to occipital margin uniformly densely blanketed with sharply defined reticulate-punctate sculpture 13

— Dorsum of head from level of midlength of eyes to occipital margin not uniformly blanketed with sharply defined reticulate-punctate sculpture; either the surface finely shagreened with a few punctulate patches, or only with fine shagreening, reticulation, or with superficial reticular patterning only 15

13 Ventral surface of head with numerous extremely long anteriorly curved J-shaped ammochaete hairs (Fig. 36). Scapes relatively long, SI 117–128. (Angola, Namibia, Botswana, Zimbabwe) ..... ***rufulum*** (part; p. 359)

— Ventral surface of head with a few short hairs which may be straight or curved, but lacking long J-shaped ammochaete hairs. Scapes relatively short, SI 85–115 14

14 Small species, HW 0·40–0·48; SI 104–115 (Figs 56, 60). Eyes with 7 or fewer (usually 6) ommatidia in the longest row. Head and alitrunk yellow to very light yellow-brown. (Cosmopolitan tramp-species, frequent in houses and other buildings) ..... ***pharaonis*** (p. 356)

— Larger species, HW 0·57–0·80; SI 85–100. Eyes with 9–11 ommatidia in the longest row. Head and alitrunk dark brown to blackish. (Zimbabwe, Botswana, South Africa) ..... ***junodi*** (p. 346)

15 Eyes with maximum diameter 0·22–0·24 × HW; scapes short and head broad, SI 88–95, CI 80–85. Projecting median portion of clypeus with its anterior free margin conspicuously concave. (South Africa) ..... ***delagoense*** (p. 341)

— Eyes with maximum diameter 0·27–0·31 × HW; scapes long and head narrow, SI 113–130, CI 70–76. Projecting median portion of clypeus with its anterior free margin transverse to convex 16

16 Pronotum with a single pair of standing hairs, situated at the humeri (Fig. 55). SI 113–120. Alitrunk dark brown to blackish, approximately the same colour as the gaster. (Namibia) ***vatranum*** (p. 362)

— Pronotum with 2–3 pairs of standing hairs on the dorsum behind the pair situated at the humeri (Fig. 50). SI 124–130. Alitrunk light to dull orange, the gaster dark brown to black and distinctly much darker than the alitrunk. (Namibia) ..... ***marshi*** (p. 349)

17 First gastral tergite with appressed pubescence but lacking standing (erect to subdecumbent) longer hairs anterior to the transverse row at the apex of the sclerite; sometimes even the apical transverse row of hairs absent 18

— First gastral tergite with appressed pubescence and always with standing (erect to subdecumbent) longer hairs also present anterior to the transverse row at the apex of the sclerite. Standing hairs on the first gastral tergite varying from numerous to a single pair situated at one-third or one-half of the length of the sclerite 28

18 Dorsum of head uniformly blanketed with granular or shagreenate sculpture, or uniformly reticulate-punctate, the surface opaque 19

— Dorsum of head only with very faint superficial reticular patterning which appears inlaid into the surface, without raised or roughened sculpture, the surface polished smooth and shining 24

19 With the head in profile the eyes drawn out anteroventrally into a point or lobe, the long axis of the eye directed obliquely downwards from back to front and very obviously out of alignment with the long axis of the head (Fig. 57). Eyes situated in front of the midlength of the sides of the head. Fourth (basal) tooth of mandible much smaller than the third and frequently reduced to an offset small denticle. Scapes shorter, SI 80–90 20

— With the head in profile the eyes normal, not drawn out anteroventrally into a point or lobe, the long axis of the eye about parallel to the long axis of the head (Figs 45, 46). Eyes situated at or very near to the midlength of the sides of the head. Fourth (basal) tooth of mandible as large as or only slightly smaller than the third. Scapes longer, SI 98–116 22

20 Eyes relatively large, maximum diameter 0·29–0·33 × HW, conspicuously reniform in profile and with the ventral ocular margin concave (Fig. 57). (Botswana) ..... ***setuliferum*** (p. 370)

— Eyes smaller, maximum diameter 0·23–0·28 × HW, drawn out into a lobe or point anteroventrally but not reniform, the ventral ocular margin shallowly convex to flat or rarely extremely feebly concave 21

21 Sculpture on dorsum of pronotum entirely of sharply defined reticulate-punctation. Posterior

one-third of cephalic dorsum reticulate-punctate. (Angola, Malawi) ..... ***ebangaense*** (p. 367)

— Sculpture on dorsum of pronotum of partially effaced or shagreenate reticulate-punctation, the punctures not sharply defined everywhere and frequently only with a shagreenate appearance. Posterior one-third of cephalic dorsum silky or even striolate, the sculpture with a smeared amorphous appearance, not sharply reticulate-punctate. (Angola, Zimbabwe, South Africa) ..... ***notulum*** (p. 370)

22 With the head in profile the posteroventral occipital angles not broadly evenly convex; instead the angles are either bluntly right-angled or acute (Fig. 45). Viewed from above and behind the posteroventral occipital angles prominent and acute. Dorsum of head from level of midlength of eyes to occipital margin usually uniformly sharply reticulate-punctate. Maximum diameter of eyes 0·24–0·27 × HW. Larger species, HW 0·66–0·80. (Ethiopia, Sudan, Kenya, Rwanda, Tanzania, Zaire, Central African Republic, Zimbabwe, Ivory Coast, Ghana) ..... ***afrum*** (p. 334)

— With the head in profile the posteroventral occipital angles evenly broadly rounded (Fig. 46). Viewed from above and behind the posteroventral occipital angles broadly rounded, not prominent. Dorsum of head from level of midlength of eyes to occipital margin usually not uniformly reticulate-punctate but instead granulate to shagreenate, with a silky appearance or with extremely fine striolae. Either eyes large, maximum diameter 0·30–0·35 × HW (with HW range 0·67–0·88), or much smaller species with HW 0·42–0·51 23

23 Eyes with 12–14 ommatidia in the longest row. Larger species with broader head and shorter scapes, HW 0·67–0·88, CI 78–88, SI 98–104. With alitrunk in profile the promesonotal outline with the posterior portion of the mesonotum sharply downcurved and descending to the impressed metanotal groove (Fig. 46). (Sudan, Mali, Niger, Senegal)
areniphilum (part; p. 336)

— Eyes with 7–9 ommatidia in the longest row. Smaller species with narrower head and longer scapes, HW 0·42–0·51, CI 72–75, SI 110–116. With alitrunk in profile the promesonotal outline approximately flat to the metanotal groove. (Namibia, Botswana)
damarense (part; p. 340)

24 With the head in full-face view the eyes situated conspicuously in front of the midlength of the sides 25

— With the head in full-face view the eyes situated at or very close to the midlength of the sides 26

25 Dark brown larger species, HW 0·56–0·68. Eyes larger, maximum diameter 0·33–0·36 × HW. In profile the eyes drawn out into an anteroventrally directed lobe, the eyes weakly reniform in shape (Fig. 58). Head somewhat broader and scapes shorter, CI 79–83, SI 80–90. (Namibia) ..... ***alamarum*** (p. 367)

— Yellow smaller species, HW 0·33–0·36. Eyes smaller, maximum diameter 0·26–0·28 × HW. In profile the eyes approximately oval. Head somewhat narrower and scapes longer, CI 75–77, SI 92–97. (Botswana) ..... ***rabirium*** (part; p. 358)

26 Node of petiole with a single pair of hairs, which project posteriorly. Scapes slightly longer and eyes larger, SI 95–100, maximum diameter of eyes 0·26–0·28 × HW. (Namibia)
nirvanum (p. 351)

— Node of petiole without projecting hairs. Scapes slightly shorter and eyes smaller, SI 90–95, maximum diameter of eyes 0·21–0·25 × HW 27

27 Yellow species with relatively broad head, CI 80–84. Eyes exactly at midlength of sides of head and their maximum diameter 0·21–0·24 × HW. (Zimbabwe, South Africa) ..... ***mediocre*** (p. 349)

— Blackish brown species with relatively narrow head, CI 77–78. Eyes slightly in front of midlength of sides of head and their maximum diameter 0·24–0·25 × HW. (Namibia)
esharre (p. 343)

28 Eyes extremely large, maximum diameter 0·37–0·40 × HW, and scapes with SI > 110 (Fig. 52). (Namibia) ..... ***viator*** (p. 363)

— Either eyes smaller, maximum diameter <0·36 × HW, or scapes shorter, SI < 110, or both 29

29 Dorsum of head from level of midlength of eyes to occipital margin with extremely faint vestigial superficial reticular patterning only, the surface polished and shining 30

— Dorsum of head from level of midlength of eyes to occipital margin with granular or shagreenate sculpture, or uniformly reticulate-punctate, the surface opaque and never only with superficial reticular patterning 36

30 Dorsum of head behind level of frontal lobes with appressed pubescence but without standing hairs of any description 31

— Dorsum of head behind level of frontal lobes with appressed pubescence and with standing hairs also present. The standing hairs are usually sparse and arranged in pairs on each side of the midline; generally a conspicuous pair present close to the point where the dorsum curves into the occipital margin 33

31 Eyes relatively large and scapes relatively short; maximum diameter of eye 0·35 × HW and SI 92. (Ethiopia) ..... ***ophthalmicum*** (p. 353)

— Either eyes relatively small or scapes relatively long, or both; maximum diameter of eye <0·35 × HW (range 0·24–0·31 × HW) and SI 88–102, but if SI 88–93 then eyes are only 0·24–0·26 × HW 32

32 Alitrunk in profile with promesonotal dorsal outline evenly convex from front to back, highest at about the midlength. Propodeal dorsal outline forming a separate surface behind the conspicuous metanotal groove, not merely continuing the slope of the promesonotal dorsum (Fig. 54). HW 0·50–0·60, CI 79–93, SI 88–93; maximum diameter of eye 0·24–0·26 × HW. (South Africa) ..... ***willowmorense*** (p. 364)

— Alitrunk in profile with promesonotal dorsal outline almost flat and sloping from front to back, its highest point well in front of the midlength. Propodeal dorsal outline continuing the slope of the promesonotum behind the virtually unimpressed metanotal groove (Fig. 49). HW 0·43–0·45, CI 73–75, SI 100–102; maximum diameter of eye 0·29–0·31 × HW. (Namibia) ***kitectum*** (p. 347)

33 Small species with relatively large eyes, HW 0·46–0·52, maximum diameter of eye 0·28–0·32 × HW. CI 73–78. Peduncle of petiole anteroventrally with a conspicuous lamellate blunt tooth or prominent lobe (Fig. 48). (Namibia) ..... ***drapenum*** (p. 342)

— Larger species with relatively small eyes, HW 0·67–0·80, maximum diameter of eye 0·21–0·23 × HW. CI 80–86. Peduncle of petiole anteroventrally with an angle which is usually broadly and bluntly rounded, without a lamellate tooth or prominent lobe 34

34 Sculpture of promesonotal dorsum almost effaced. Node of postpetiole dorsally unsculptured, smooth and shining. With propodeum in dorsal view the posteriorly divergent ridges separating the dorsum from the sides sharply defined and narrowly rounded. (South Africa) ***orangiae*** (p. 354)

— Sculpture of promesonotal dorsum fine but conspicuous. Node of postpetiole dorsally with fine granular to punctulate sculpture. With propodeum in dorsal view the posteriorly divergent ridges separating the dorsum from the sides very poorly defined and broadly rounded, often virtually effaced 35

35 Slightly larger species with fractionally broader head and shorter scapes, HW 0·74–0·82, CI 82–86, SI 95–100. (South Africa) ..... ***tchelichofi*** (p. 362)

— Slightly smaller species with fractionally narrower head and longer scapes, HW 0·67–0·68, CI 80–81, SI 101–103. (South Africa) ..... ***fridae*** (p. 344)

36 With the head in full-face view the cephalic dorsum from the level of the posterior margins of the eyes to the occipital margin uniformly densely reticulate-punctate; each puncture sharply defined and either of approximately equal size over the entire surface or becoming smaller posteriorly; without trace of any other form of sculpture 37

— With the head in full-face view the cephalic dorsum from the level of the posterior margins of the eyes to the occipital margin not uniformly reticulate-punctate. Instead the surface is more or less opaque, with shagreenate to punctate-shagreenate or extremely fine striolate sculpture, or with a silky, smeared or roughened appearance; but not having sharply defined reticulate-punctation everywhere 44

37 Head and alitrunk uniformly brown to black, the gaster approximately the same colour or slightly darker, not strongly contrasting with the head and alitrunk 38

— Head and alitrunk red to bright orange-yellow, frequently orange-red, the gaster much darker and strongly contrasting with the head and alitrunk 40

38 First gastral tergite with about 10 pairs of hairs in front of the apical transverse row. Smaller species, HW 0·48, SL 0·50–0·51, PW 0·33–0·34. (South Africa) ..... ***micropacum*** (p. 350)

— First gastral tergite with only 1–2 pairs of hairs in front of the apical transverse row. Larger species, HW > 0·60, SL > 0·60, PW > 0·40 39

39 In profile the propodeal dorsum sloping posteriorly, the junction of dorsum and declivity indicated by a sharply defined or subdentate angle. (Zaire) ..... ***subdentatum*** (p. 359)

— In profile the propodeal dorsum about horizontal, the dorsum rounding evenly into the declivity without passing through a sharp or subdentate angle. (Uganda, Zaire, Angola, Zambia, Zimbabwe) ..... ***opacum*** (p. 353)

40 Basal (fourth) tooth of mandible reduced to a minute denticle, only a fraction the size of the third tooth. Ventral surface of head with numerous extremely long anteriorly curved J-shaped ammochaete hairs (Fig. 36). (Angola, Namibia, Botswana, Zimbabwe) ***rufulum*** (part; p. 359)

— Basal (fourth) tooth of mandible either about the same size as the third tooth or only slightly smaller, not reduced to a minute denticle. Ventral surface of head with simple hairs which may be straight or curved, but lacking extremely long J-shaped hairs 41

41 Eyes relatively large, maximum diameter 0·31–0·33 × HW. (Angola) ..... ***personatum*** (p. 356)

— Eyes relatively small, maximum diameter 0·23–0·27 × HW 42

42 Pilosity on basal half of first gastral tergite sparse, usually with only 1–3 pairs of hairs. Very rarely 4 pairs may occur, in which case the anterior free margin of the median portion of the clypeus is shallowly impressed, the projecting angles on each side of the impression low broad and blunt. (Ethiopia, Sudan, Djibouti, Kenya, Liberia, Burkina Faso, Ghana, Nigeria, Togo, Cameroun, Zaire; also occurring in North Africa and the Arabian Peninsula) ..... ***bicolor*** (p. 338)

— Pilosity on basal half of first gastral tergite dense, usually with 6–8 pairs of hairs. If pilosity at lower end of this range then the anterior free margin of the median portion of the clypeus is deeply indented and the projecting angles on each side of the indentation form sharp prominent teeth 43

43 Anterior free margin of median portion of clypeus concave in full-face view, the concavity flanked by a pair of freely projecting acute teeth (Fig. 43). (Kenya) ..... ***westi*** (p. 363)

— Anterior free margin of median portion of clypeus shallowly concave in full-face view and flanked by a pair of bluntly rounded angles, without projecting teeth. (Angola) ... ***dictator*** (p. 341)

44 Standing hairs on first gastral tergite, discounting the apical transverse row, numerous and more or less evenly distributed; obviously with more than 3 pairs present and the hairs not restricted to the basal half of the sclerite 45

— Standing hairs on first gastral tergite, discounting the apical transverse row, sparse and restricted in distribution; with only 1–3 pairs present which are generally confined to the basal half of the sclerite. When only one pair present it is usually at the midlength 50

45 Alitrunk and gaster approximately the same colour, the two not strongly contrasting 46

— Alitrunk and gaster conspicuously differently coloured, the two obviously strongly contrasting 48

46 Dimensions in range HW 0·53–0·60, SL 0·62–0·72, CI 74–77, SI 117–122. (Namibia) ***mantazenum*** (p. 348)

— Dimensions in range HW 0·43–0·51, SL 0·44–0·58, CI 70–74, SI 102–116 47

47 Uniformly yellow species. SI 108–116. Maximum diameter of eye 0·26–0·30 × HW. (Angola, Namibia) ..... ***minor*** (p. 350)

— Uniformly brown species. SI 102–107. Maximum diameter of eye 0.24–0.26 × HW. (Ethiopia) ..... ***carbo*** (p. 339)

48 Larger species, HW 0·59–0·69, SL 0·60–0·70, PW 0·43–0·48, length of hind femur 0·70–0·82, maximum diameter of eye 0·16–0·17. Propodeal dorsum shallowly but distinctly transversely concave. In available material larger workers with a single ocellus present. (South Africa) ***ocellatum*** (p. 352)

— Smaller species, HW 0·44–0·47, SL 0·44–0·45, PW 0·30–0·31, length of hind femur 0·48–0·50, maximum diameter of eye 0·10–0·14. Propodeal dorsum not concave. No ocelli developed ... 49

49 Head and alitrunk orange-yellow, gaster blackish brown. Maximum diameter of eye 0·23–0·24 × HW, with 7–8 ommatidia in the longest row. (Senegal) ..... ***dakarense*** (p. 339)

— Head and alitrunk medium yellowish brown, gaster dark brown. Maximum diameter of eye 0·30 × HW, with 10 ommatidia in the longest row. (Ethiopia, Sudan) ..... ***parvinode*** (p. 355)

50 Eye with 10 or more ommatidia in the longest row. HW 0·50–0·88 51

— Eye with 7–9 ommatidia in the longest row. HW 0·43–0·52 54

51 Dorsal outline of alitrunk in profile very characteristically shaped (Fig. 46), the posterior one-third or more of the mesonotum suddenly downcurved and descending steeply to the metanotal groove. Larger species, HW 0·67–0·88. (Sudan, Mali, Niger, Senegal; also present north of the Sahara Desert) ..... ***areniphilum*** (part; p. 336)

— Dorsal outline of alitrunk in profile not shaped as above, the posterior one-third of the mesonotum continuing the even gradually curved slope of the anterior portion, not suddenly downcurved and steeply descending. Smaller species, HW 0·50–0·64 52

52 Smaller species with relatively very large eyes, HW 0·50–0·57, maximum diameter of eye 0·35–0·38 × HW. (Kenya) ..... ***sutu*** (p. 361)

— Larger species with relatively small eyes, HW 0·54–0·64, maximum diameter of eye 0·24–0·30 × HW 53

53 Prominent median section of clypeus with its anterior free margin indented centrally. Dorsum of head with 0–1 pairs of standing hairs behind the level of the frontal lobes. Maximum diameter of eye 0·27–0·30 × HW. Promesonotum reticulate-punctate dorsally. Cephalic sculpture strong, granulate to shagreenate-punctate. (Senegal, Niger; widespread north of the Sahara, in European lands bordering the Mediterranean, and Middle East to India; present as an introduction in South Africa, Madagascar and Sri Lanka) ..... ***subopacum*** (p. 360)

— Prominent median section of clypeus with its anterior free margin transverse. Dorsum of head with 3–4 pairs of standing hairs behind the level of the frontal lobes. Maximum diameter of eye 0·24–0·26 × HW. Promesonotum with weak reticular patterning dorsally. Cephalic sculpture feeble, superficially reticulate without overlying granulate or shagreenate-punctate component. (Namibia: Possession I.) ..... ***herero*** (p. 345)

54 Antennal scapes both absolutely and relatively shorter, SL 0·40–0·43, SI 89–93. (Zimbabwe) ***disertum*** (p. 342)

— Antennal scapes both absolutely and relatively longer, SL 0·47–0·57, SI 100–110 55

55 Shagreenate-granular sculpture of dorsal head and pronotum strongly developed, the surfaces everywhere dull and opaque 56

— Shagreenate-granular sculpture of dorsal head and pronotum very feebly developed, the surfaces semi-smooth and weakly shining 57

56 Dorsum of head with 2 pairs of standing hairs behind level of frontal lobes. Eyes averaging somewhat smaller, 0·24–0·26 × HW. (Botswana, Zimbabwe, South Africa) ..... ***opacior*** (p. 352)

— Dorsum of head without standing hairs behind level of frontal lobes. Eyes averaging somewhat larger, 0·27–0·31 × HW. (Namibia, Botswana) ..... ***damarense*** (part; p. 340)

57 Entirely yellow. (Botswana) ..... ***termitarium*** (p. 362)

— Head and alitrunk medium brown, gaster dark brown 58

58 Dorsum of pronotum finely shagreenate, with a roughened silky appearance; dorsum of mesonotum reticulate-punctate, the two forms of sculpture contrasting. Slightly smaller species, HW 0·47, SL 0·47. (South Africa) ..... ***anceps*** (p. 336)

— Dorsum of pronotum finely reticulate, dorsum of mesonotum reticulate-punctate; the two not contrasting but rather the sculpture of the former appearing as a reduced version of that of the latter. Slightly larger species, HW 0·50–0·52, SL 0·50–0·54. (South Africa) ... ***australe*** (p. 337)

59 Propodeal spiracle vertically slit-shaped or elliptical. Anterior clypeal margin with a pair of prominent strong teeth which overhang the mandibles (Figs 31, 32), these teeth widely separated and the distance between them greater than the maximum width across the frontal lobes. (Ethiopia, Sudan, Burkina Faso, Nigeria, Benin, Ghana) ..... ***abyssinicum*** (p. 321)

— Propodeal spiracle circular to subcircular. Anterior clypeal margin lacking prominent teeth of any description 60

60 Propodeal dorsum reticulate-punctate. Eyes relatively large, maximum diameter 0·27–0·33 × HW 61

— Propodeal dorsum finely transversely striolate to transversely rugulose, sometimes the sculpture very reduced in small workers so that the surface appears virtually smooth. Eyes relatively small, maximum diameter 0·13–0·20 × HW 62

61 Mesonotum and propodeum dorsally with standing hairs present. Mandibles with only 3 teeth. Larger species with relatively broad head and short scapes, HW 0·62–0·69, CI 86–90, SI 78–82; maximum diameter of eye 0·27–0·30 × HW. (South Africa) ..... ***havilandi*** (p. 368)

— Mesonotum and propodeum dorsally without standing hairs or the former with a single short pair (Fig. 59). Mandibles with 3 teeth plus a smaller basal denticle. Smaller species with relatively narrow head and longer scapes, HW 0·42–0·45, CI 78–80, SI 84–90; maximum diameter of eye 0·31–0·33 × HW. (South Africa) ..... ***macrops*** (p. 369)

62 Head yellow, alitrunk dark brown, gaster yellow; the colours of the head and alitrunk strongly contrasting. (Zaire) ..... ***epinotale*** (p. 326)

— Head and alitrunk uniformly yellow or uniformly brown, gaster approximately the same colour or darker; the colours of the head and alitrunk not strongly contrasting 63

63 Head and alitrunk brown, usually dark brown 64

— Head and alitrunk yellow 65

64 Species with very little size variation in any given sample, without transverse fine rugular sculpture on the posterior surface of the head where it curves down towards the occipital foramen (Figs 35, 41). (Somalia, Kenya; also occurs in Madagascar) ..... ***robustior*** (p. 328)

— Species with marked size variation in any given sample, the medium to large workers with transverse fine rugulose sculpture on the posterior surface of the head where it curves down towards the occipital foramen (Fig. 34). (Sudan, Mali, Niger; widespread in Africa north of the Sahara and in the Near and Middle East) ..... ***mayri*** (p. 326)

65 Petiole node in dorsal view subglobular; postpetiole node in dorsal view only slightly broader than long (Fig. 39). (Pantropical tramp, probably of Indian origin) ..... ***destructor*** (part; p. 324)

— Petiole node in dorsal view transverse, distinctly compressed from front to back and obviously much broader than long; postpetiole node in dorsal view distinctly broader than long (Fig. 40). (Nigeria, Ghana, Ethiopia, Uganda, Zaire, Tanzania, Zimbabwe, Botswana, South Africa) ..... ***oscaris*** (part; p. 326)

66 Eyes minute and point-like, consisting of only one or two ommatidia (Figs 93, 94) 67

— Eyes conspicuous, distinctly with more than two ommatidia 74

67 Metanotal groove in profile a simple indentation of the surface which is scarcely impressed (Fig. 95). Propodeum in absolute profile with the dorsum and declivity meeting in a rounded or sharp angle, but without small teeth or projecting denticles at their junction. (Ivory Coast, Kenya, South Africa) ..... ***modestum*** (p. 423)

— Metanotal groove in profile a sharply impressed U- or V-shaped depression (Fig. 94). Propodeum in absolute profile with the dorsum and declivity meeting in a sharp angle which is usually equipped with a minute but conspicuous projecting denticle 68

68 Brown to blackish brown species 69

— Yellow species 70

69 Lower half of mesopleuron sculptured. Propodeum in dorsal view with a short transverse crest behind the metanotal groove, this crest appearing as a narrow acute peak in profile at the summit of the propodeum immediately behind the metanotal groove. (Ivory Coast, Togo) ***malamixtum*** (p. 423)

— Lower half of mesopleuron smooth. Propodeum in dorsal view without a transverse crest behind the metanotal groove, in profile the propodeal dorsum raised and narrowly rounded immediately behind the metanotal groove but this raised portion not surmounted by an acute peak. (Ivory Coast, Ghana, Nigeria, Cameroun, Gabon, Zaire) ..... ***cryptobium*** (part; p. 421)

70 Lower half of mesopleuron sculptured. (Rwanda) ..... ***sersalatum*** (p. 424)

— Lower half of mesopleuron smooth 71

71 Smaller species, HL 0·36–0·43, HW 0·28–0·34, SL 0·26–0·31. (Ivory Coast, Ghana, Nigeria, Cameroun, Gabon, Zaire) ..... ***cryptobium*** (part; p. 421)

— Larger species, HL 0·46–0·55, HW 0·38–0·43, SL 0·36–0·44 72

72 Antennal scapes relatively short, SI 91–95. (Kenya) ..... ***elgonense*** (p. 422)

— Antennal scapes relatively long, SI 103–110 73

73 Pubescence of scapes and of sides of head behind eyes dense and erect to suberect (Fig. 93). CI 80–83. (Ivory Coast) ..... ***thrascoleptum*** (p. 424)

— Pubescence of scapes and of sides of head behind eyes sparse and short, appressed. CI 72–75. (South Africa) ..... ***jonesi*** (p. 422)

74 Dorsum of propodeum sculptured, even if only feebly so, the sculpture consisting of fine transverse striation or reticulate-punctation 75

— Dorsum of propodeum unsculptured, smooth and shining everywhere 88

75 Dorsal surfaces of alitrunk and first gastral tergite without standing hairs 76

— Dorsal surfaces of alitrunk or first gastral tergite, or both, with standing hairs present 78

76 Cephalic dorsum finely shagreenate everywhere except for a smooth median longitudinal narrow strip. (Kenya) ..... ***osiridis*** (p. 354)

— Cephalic dorsum smooth or at most sculptured with only the faintest vestiges of superficial reticular patterning 77

77 Pronotal dorsum reticulate to shagreenate. Cephalic dorsum with sculpture close to the occipital margin. SI 92–97. (Botswana) ..... ***rabirium*** (part; p. 358)

— Pronotal dorsum unsculptured. Cephalic dorsum smooth with scattered hair-pits close to the occipital margin. SI 85–88. (South Africa) ..... ***zulu*** (p. 365)

78 Mandibles with 5 teeth which decrease in size from apex to base. PF 3,3. (Tanzania: Pemba I.; widespread in Oriental and Indo-Australian regions) ..... ***latinode*** (p. 429)

— Mandibles with 4 teeth, or 3 teeth plus an offset basal denticle, or with only 3 teeth. PF 2,2 or less 79

79 Central portion of clypeus in full-face view with a pair of strongly anteriorly divergent sharp carinae which terminate in a pair of freely projecting teeth or denticles anteromedially.

Frontal lobes closely approximated, the posteriormost portion of the clypeus which runs between them reduced to a narrow strip which is only slightly wider than either of the frontal lobes (Fig. 97) 80

— Central portion of clypeus in full-face view without strongly anteriorly divergent sharp carinae and lacking freely projecting teeth or denticles anteromedially. Instead the margin here is convex to shallowly concave. Frontal lobes farther apart, the posteriormost portion of the clypeus which runs between them distinctly much wider than either of the frontal lobes 83

80 Propodeal dorsum strongly transversely rugulose. Mesopleuron, metapleuron and sides of propodeum mostly densely sculptured, smooth areas restricted to immediate vicinity of propodeal spiracle and a small patch high on the mesopleuron. (Cameroun) ..... ***jacksoni*** (p. 427)

— Propodeal dorsum feebly to vestigially transversely striolate. Mesopleuron, metapleuron and sides of propodeum mostly to entirely smooth, at most with patches of sculpture over the metapleural gland bulla and at the extreme base of the mesopleuron 81

81 Body colour uniform blackish brown to jet black. (Guinea, Ivory Coast, Ghana, Nigeria, Cameroun) ..... ***invidium*** (part; p. 427)

— Body colour light to medium brown 82

82 Eyes consisting of only 6–7 ommatidia, their maximum diameter 0·13–0·15 × HW. (Kenya) ***valtinum*** (p. 428)

— Eyes consisting of more than 10 ommatidia, their maximum diameter 0·16–0·18 × HW. (Kenya) ..... ***hanneli*** (p. 426)

83 Fourth (basal) tooth of mandible only slightly smaller than the third, not reduced to a minute offset basal denticle, nor widely separated from the third tooth. Dorsum and sides of propodeum blanketed everywhere with dense reticulate-punctate sculpture 84

— Fourth (basal) tooth of mandible minute, reduced to a tiny offset denticle which is much smaller than the third tooth and is widely separated from it. Dorsum and sides of propodeum not uniformly reticulate-punctate, instead the dorsum is minutely and usually faintly transversely striolate and the sides lack sculpture at least in part 85

84 Larger species, HW 0·38–0·46, SL 0·33–0·38, AL 0·50–0·54; CI 88–92. (Zaire, Central African Republic, Uganda) ..... ***malatu*** (p. 399)

— Smaller species, HW 0·34, SL 0·30, AL 0·40; CI 81. (Zaire) ..... ***affabile*** (p. 375)

85 Head yellow, alitrunk dark brown, gaster yellow; the colours of the head and alitrunk strongly contrasting. (Zaire) ..... ***epinotale*** (part; p. 326)

— Head and alitrunk uniformly yellow or uniformly brown, the gaster approximately the same colour or darker; the colours of the head and alitrunk not strongly contrasting 86

86 Head and alitrunk brown, usually dark brown. (Sudan, Mali, Niger; widespread in Africa north of the Sahara Desert and in the Near and Middle East) ..... ***mayri*** (part; p. 326)

— Head and alitrunk yellow 87

87 Petiole node in dorsal view subglobular; postpetiole node only slightly broader than long (Fig. 39). (Pantropical tramp, probably of Indian origin) ..... ***destructor*** (part; p. 324)

— Petiole node in dorsal view transverse, distinctly compressed from front to back and obviously much broader than long; postpetiole node distinctly broader than long (Fig. 40). (Nigeria, Ghana, Ethiopia, Uganda, Zaire, Tanzania, Zimbabwe, Botswana, South Africa) ***oscaris*** (part; p. 326)

88 Eye in profile drawn out anteriorly into a very long lobe or prominence which projects anteroventrally across and down the side of the head, almost extending onto the ventral surface of the head. (South Africa) ..... ***xanthognathum*** (p. 371)

— Eye oval to more or less round in profile, not drawn out into a long anteroventrally projecting lobe 89

89 Frontal lobes closely approximated, the posteriormost portion of the clypeus which runs between them reduced to a very narrow strip which is only fractionally wider than either of the frontal lobes. Dorsum and declivity of propodeum meeting in a pronounced angle (Fig. 98) 90

— Frontal lobes farther apart, the posteriormost portion of the clypeus which runs between them distinctly much wider than either of the frontal lobes. Dorsum and declivity of propodeum in profile rounding together or forming a single continuous curve, not meeting in a pronounced angle 91

90 Petiole and postpetiole very narrow and scale-like in profile, the postpetiole especially markedly anteroposteriorly compressed (Fig. 96). In dorsal view the postpetiole dorsum

scarcely thicker than the petiole. (Guinea) ..... ***guineense*** (p. 426)

— Petiole and postpetiole not scale-like in profile, the postpetiole nodiform (Fig. 98). In dorsal view the postpetiole dorsum distinctly thicker than the petiole. (Guinea, Ivory Coast, Ghana, Nigeria, Cameroun) ..... ***invidium*** (part; p. 427)

91 With the head in profile the eye consisting of a peripheral ring of ommatidia encircling a single longitudinal row of ommatidia within the ring 92

— With the head in profile the eye consisting of a peripheral ring of ommatidia encircling two or more longitudinal rows of ommatidia within the ring 97

92 Promesonotal dorsum with only a single pair of standing hairs, at the pronotal humeri. Propodeal dorsum without standing hairs. (Botswana) ..... ***sryetum*** (p. 413)

— Promesonotal dorsum with more than one pair of standing hairs. Propodeal dorsum with at least one pair of standing hairs present 93

93 Dorsum of head brown, varying from medium brown to blackish brown 94

— Dorsum of head yellow, varying from pale yellow to dingy yellow 95

94 Head and alitrunk the same shade of brown, species not bicoloured. Anterior clypeal margin broadly and evenly convex between the inner points of the mandibular insertions. SI 76–79. Maximum diameter of eye 0·16 × HW. (Zaire) ..... ***inquietum*** (p. 394)

— Head brown to blackish brown, the alitrunk lighter, usually yellow so that the species is bicoloured. Anterior clypeal margin with a clearly differentiated prominent median section, not evenly convex between the inner points of the mandibular insertions. SI 86–94. Maximum diameter of eye 0·21–0·24 × HW. (Pantropical tramp-species) ..... ***floricola*** (p. 390)

95 Maximum diameter of eye 0·23–0·24 × HW. First gastral tergite uniformly yellow. (Zimbabwe) ..... ***shilohense*** (p. 410)

— Maximum diameter of eye 0·17–0·19 × HW. First gastral tergite with basal half pale yellow, apical half brown 96

96 Small species with relatively short scapes, HW 0·30, SL 0·22, SI 73. (Ghana) ..... ***trake*** (p. 417)

— Larger species with relatively longer scapes, HW 0·34–0·38, SL 0·28–0·30, SI 79–83. (Kenya, South Africa) ..... ***rotundatum*** (p. 409)

97 Larger species with relatively very short antennal scapes, HW 0·72–0·74, SI 73–75. Promesonotum with 20 or more pairs of standing hairs. (Tanzania) ..... ***iyenasu*** (p. 394)

— Smaller species with relatively longer antennal scapes, HW 0·30–0·55, SI 75–110; if SI < 80 then species is minute with HW at lower end of the range. Promesonotum with fewer than 12 (usually 3–10) pairs of standing hairs 98

98 Viewed from behind and slightly above the pronotum transversely almost to quite flat and the humeri conspicuously angular. (Ivory Coast, Ghana, Nigeria, Camerou, Zaire, Angola) ***egens*** (p. 385)

— Viewed from behind and slightly above the pronotum transversely evenly shallowly convex and the humeri evenly broadly rounded 99

99 Strikingly bicoloured species with alitrunk, petiole and postpetiole black to blackish brown, the head and its appendages, gaster and legs clear yellow. (Kenya) ..... ***mirandum*** (p. 401)

— Colour various shades of yellow, brown or black; usually a uniform single colour and never strikingly bicoloured as above 100

100 In full-face view the antennal scapes, when laid straight back from their insertions, just reaching to slightly exceeding the occipital margin (Fig. 61). SI 95–110 101

— In full-face view the antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin (Figs 62, 63, 70). SI 75–98 113

101 Promesonotum in profile with only 3 pairs of standing hairs (Fig. 78). With head in full-face view the posterior margins of the eyes distinctly in front of the midlength of the sides. (Zimbabwe) ..... ***binatu*** (p. 380)

— Promesonotum in profile with 4 to more than 8 pairs of standing hairs. With head in full-face view the posterior margins of the eyes at or very close to the midlength of the sides 102

102 Very small pale yellow species, HW 0·30–0·32, SL 0·30–0·34 103

— Either larger yellow species, HW 0·38–0·50, SL 0·38–0·56, or colour conspicuously dark brown to black 104

103 Occipital margin of head broadly and shallowly concave in full-face view. Propodeal spiracle minute and pinhole-like. SI 106–107, CI 75–76. (Kenya) ..... ***speluncarum*** (p. 411)

— Occipital margin of head convex in full-face view. Propodeal spiracle conspicuous, not minute and pinhole-like. SI 95–100, CI 78–84. (Gabon, Zaire) ..... ***gabrielense*** (p. 392)

104 Colour brown to black. Alitrunk in profile with promesonotum strongly domed-convex (as in

Fig. 76), the highest point at about the midlength. Smaller species, HW 0·32–0·40, SL 0·32–0·42 105

— Colour yellow to light brown. Alitrunk in profile with promesonotum quite shallowly evenly convex (Figs 64, 65, 67–69, 75), the highest point in front of the midlength. Generally larger species, HW 0·38–0·50, SL 0·38–0·56; species in the narrow zone where measurements overlap are very distinctly yellow in colour 106

105 Legs very pale indeed, conspicuously very much lighter than the alitrunk, sometimes virtually colourless. HL 0·39–0·42, SL 0·32–0·36, AL 0·44–0·46. (Cameroun, Gabon, Angola) ***draxocum*** (p. 385)

— Legs yellowish brown, only slightly lighter than alitrunk, always distinctly coloured. HL 0·46–0·50, SL 0·39–0·42, AL 0·54–0·58. (Cameroun) ..... ***noxitum*** (p. 403)

106 With alitrunk in dorsolateral view the metanotal groove very narrow and traversed by extremely short and inconspicuous cross-ribs. Propodeal spiracle minute and pinhole-like (Fig. 75) 107

— With alitrunk in dorsolateral view the metanotal groove broad and traversed by long sharply defined and conspicuous cross-ribs. Propodeal spiracle large and very obvious, not pinhole-like (Figs 64, 65, 67–69) 109

107 Dingy light brown species. Promesonotum with 8 or more pairs of standing hairs dorsally. HL 0·60–0·63, HW 0·48–0·50. (Lesotho) ..... ***bevisi*** (p. 379)

— Yellow species. Promesonotum with 4–6 pairs of standing hairs dorsally. HL 0·50–0·58, HW 0·38–0·46 108

108 Eyes slightly larger, maximum diameter 0·24–0·27 × HW. Scapes relatively shorter, SI 97–102. (Namibia, Lesotho, South Africa) ..... ***schultzei*** (p. 410)

— Eyes slightly smaller, maximum diameter 0·20–0·23 × HW. Scapes relatively longer, SI 104–110. (South Africa) ..... ***excensurae*** (p. 386)

109 Dorsal surface of propodeum transversely flat or even feebly concave between a pair of blunt and ill-defined low longitudinal rims which separate the dorsum proper from the sides. (Sudan) ..... ***kineti*** (p. 396)

— Dorsal surface of propodeum transversely convex, or if somewhat flattened then the flattened area not bounded by a pair of low longitudinal rims which separate the dorsum proper from the sides 110

110 Promesonotal dorsum with 4–6 pairs of standing hairs 111

— Promesonotal dorsum with 8 or more pairs of standing hairs 112

111 With alitrunk in profile the metanotal groove forming a very broad shallow U-shaped trough (Fig. 69). Propodeal dorsal outline behind the metanotal groove convex and rounded, the dorsum rounding evenly into the declivity so that the two surfaces form a single smooth convexity. (Ethiopia) ..... ***crawleyi*** (p. 383)

— With alitrunk in profile the metanotal groove shallowly impressed, not forming an extensive U-shaped trough (Fig. 65). Propodeal dorsal outline behind the metanotal groove consisting of a more or less flat posteriorly-sloped zone which then rounds quite abruptly into the more steeply sloping declivity, the two surfaces not forming a single smooth convexity. (Sudan, Kenya) ..... ***arboreum*** (p. 377)

112 Subpetiolar process a conspicuous lobe (Fig. 67). With the head in full-face view the sides behind the eyes with all hairs decumbent to appressed. SL 0·50–0·56. (Zimbabwe) ***firmum*** (p. 387)

— Subpetiolar process a low ridge (Fig. 68). With the head in full-face view the sides behind the eyes with all hairs suberect to subdecumbent. SL 0·39–0·48. (Zimbabwe, Rwanda) ***vecte*** (p. 419)

113 Propodeal spiracle with a large circular orifice which is very conspicuous and dominates the side of the propodeum (Fig. 66) 114

— Propodeal spiracle with a small or minute circular orifice which usually appears as a pinhole in the side of the propodeum (Figs 74–90) 119

114 Median clypeal carinae terminating at anterior clypeal margin in a pair of elongate subspiniform teeth which are usually somewhat curved towards the midline and which project out over the mandibles (Fig. 73). (Sierra Leone, Guinea) ..... ***occidentale*** (p. 404)

— Median clypeal carinae terminating at anterior clypeal margin in a pair of short broad triangular denticles or merely a pair of acute or blunt angles; without elongate teeth which project out over the mandibles 115

115 Median portion of clypeus with its anterior free margin convex between the points of termination of the clypeal carinae; the carinae themselves low, rounded and poorly defined,

and their points of termination not prominent. (South Africa) ..... ***kelapre*** (p. 395)

— Median portion of clypeus with its anterior free margin concave between the points of termination of the clypeal carinae; the carinae themselves conspicuous and their points of termination prominent as denticles or projecting angles 116

116 Head and body yellow 117

— Head and body brown 118

117 Nodes of both petiole and postpetiole high and narrow in profile, the postpetiole with a flat and vertical anterior face. SI 88–93. (Gabon, Zaire) ..... ***captator*** (p. 382)

— Nodes of petiole and postpetiole not high and narrow in profile, the postpetiole without a flat and vertical anterior face. SI 79–85. (Tanzania, Botswana, Zimbabwe) ..... ***lene*** (p. 397)

118 Dorsal alitrunk with only 4 pairs of standing hairs, of which 3 pairs are on the promesonotum and 1 pair on the propodeum. SI 90–93. (Angola) ..... ***borlei*** (p. 381)

— Dorsal alitrunk much more densely hairy, the promesonotum very obviously with more than 3 pairs and the propodeum with more than 1 pair of standing hairs (Fig. 66). SI 83–86. (Sudan, Kenya, Zaire) ..... ***leopoldinum*** (p. 397)

119 Anterior and posterior faces of both petiole and postpetiole meeting in a sharp rim or edge which is continuous around the sides and dorsum of each node. Body colour glossy black. (Ghana) ..... ***vonatu*** (p. 420)

— Anterior and posterior faces of both petiole and postpetiole not meeting in a sharp continuous rim or edge, the two surfaces either rounding bluntly together or the petiole with a slight lateral rim which does not run onto the dorsum. If the latter then colour yellow 120

120 Eyes relatively very large, the maximum diameter 0·30 × HW or more. In general the maximum length of the eye in profile is markedly greater than the distance from the anteriormost point of the eye to the closest point of the mandibular articulation (Figs 72, 74) 121

— Eyes relatively smaller, the maximum diameter <0·30 × HW. In general the maximum length of the eye in profile is usually distinctly less than the distance from the anteriormost point of the eye to the closest point of the mandibular articulation, but in a few species the two lengths may be about equal or the former fractionally greater than the latter 124

121 Uniformly dark brown to blackish brown species 122

— Uniformly yellow to light brownish yellow species 123

122 Promesonotal dorsum with 8–10 pairs of standing hairs. Longest hairs projecting from first gastral tergite distinctly longer than maximum diameter of eye. (Burkina Faso) ... ***balathir*** (p. 378)

— Promesonotal dorsum with 3–4 pairs of standing hairs. Longest hairs projecting from first gastral tergite distinctly shorter than maximum diameter of eye. (Kenya) ..... ***manir*** (p. 400)

123 Pronotum, mesonotum and propodeum each with a single pair of standing hairs, so that the alitrunk has only 3 pairs in total on the dorsum (Fig. 74). (Namibia) ..... ***katir*** (p. 395)

— Pronotum, mesonotum and propodeum each with more than one pair of hairs, so that the alitrunk very obviously has more than 3 pairs in total on the dorsum. (Kenya) ..... ***holothir*** (p. 393)

124 With the head in full-face view the eyes at or only fractionally in front of the midlength of the sides 125

— With the head in full-face view the eyes distinctly in front of the midlength of the sides 126

125 Maximum diameter of eye 0·17–0·18 × HW. SI 86–88. (Ghana) ..... ***tanysum*** (p. 416)

— Maximum diameter of eye 0·24 × HW. SI 92. (Tanzania) ..... ***disoriente*** (p. 383)

126 Projecting median portion of clypeus with its anterior margin concave, the concavity flanked by a pair of triangular prominences or denticles (at the apices of the clypeal carinae), this pair of prominences separating the anterior and lateral margins of the projecting median section of the clypeus (Fig. 62). Clypeal carinae always sharply and strongly developed, widely divergent anteriorly 127

— Projecting median portion of clypeus with its anterior margin transverse to feebly concave, the anterior margin rounding bluntly into the lateral margins or with an obtuse angle between them, but without a pair of triangular prominences or denticles separating the anterior and lateral margins of the projecting median section of the clypeus. Clypeal carinae variably developed, sometimes vestigial, sometimes sharp but almost parallel, sometimes widely divergent anteriorly 133

127 In profile the petiole and postpetiole nodes low, not anteroposteriorly compressed; the former subconical and the latter subglobular so that the summit of the postpetiole is much more broadly rounded than that of the petiole (shape approximately as in Figs 77–81) 128

— In profile the petiole and postpetiole nodes high and narrow, anteroposteriorly compressed; the summit of the postpetiole almost as narrowly rounded as that of the petiole and the

anterior face of the postpetiole vertical or nearly so (Figs 84–88) 129

128 Promesonotal dorsum with 6–7 pairs of standing hairs. Maximum diameter of eye 0·27 × HW. CI 74. (Kenya) ..... ***rastractum*** (p. 406)

— Promesonotal dorsum with 3–4 pairs of standing hairs. Maximum diameter of eye 0·21–0·23 × HW. CI 77–80. (Zimbabwe) ..... ***springvalense*** (p. 412)

129 With the propodeum in profile the spiracle relatively high on the side and close to the dorsal outline. Dorsum and declivity of propodeum confluent and forming a single sloping surface, the two not separated by a rounded angle (Fig. 84). In dorsal view the propodeal spiracles widely separated and prominent, each orifice situated at the apex of a tubercle. (Zaire) ***angustinode*** (p. 376)

— With the propodeum in profile the spiracle relatively low on the side, widely separated from the dorsal outline. Dorsum and declivity of propodeum not confluent, the two surfaces separated by a rounded angle (Figs 85–88). In dorsal view the propodeal spiracles not widely separated nor prominent, not located at the apices of tubercles 130

130 Eyes large, maximum diameter 0·26–0·28 × HW. Propodeal spiracle very small, reduced to a minute spot (Fig. 88). (Botswana) ..... ***fugelanum*** (p. 391)

— Eyes smaller, maximum diameter 0·20–0·24 × HW. Propodeal spiracle small but still distinctly present and circular (Figs 85–87) 131

131 Species combining relatively long scapes with small eyes, SI 95–98 and maximum diameter of eye 0·20–0·22 × HW. HW 0·40–0·41 and summit of petiole usually with a narrow crest towards the sides (Fig. 86). (Zimbabwe) ..... ***arnoldi*** (p. 378)

— Species combining relatively short scapes with larger eyes, SI 87–95 and maximum diameter of eye 0·22–0·24 × HW. HW outside above range, either *ca* 0·37 or 0·42–0·44 and summit of petiole without a narrow crest towards the sides (Figs 85, 87) 132

132 Promesonotum with 5 pairs of standing hairs. SI 87–89, CI 77, HW 0·37 (Fig. 85). (Congo, Zaire) ..... ***altinode*** (p. 375)

— Promesonotum with 7–8 pairs of standing hairs. SI 90–95, CI 78–81, HW 0·40–0·44 (Fig. 87). (Angola) ..... ***tynsorum*** (p. 417)

133 Subpetiolar process a large keel-like translucent lamella (Fig. 90). (South Africa) ***lubricum*** (p. 398)

— Subpetiolar process a low ridge, narrow flange or small lobe, or virtually absent 134

134 Larger species with dimensions in range SL 0·32–0·44, HL 0·46–0·60, HW 0·35–0·50 135

— Smaller species with dimensions in range SL 0·24–0·29, HL 0·40–0·45, HW 0·30–0·35 141

135 Dark brown species. Clypeal carinae vestigial to absent and the anterior clypeal margin evenly broadly convex, without a differentiated projecting central portion (Fig. 63). (South Africa) ***boerorum*** (p. 381)

— Yellow to brown species. Clypeal carinae well developed and the anterior clypeal margin with a differentiated projecting central portion, not evenly broadly convex. If colour brown then anterior clypeal margin concave medially 136

136 Eyes relatively small, the maximum diameter 0·18–0·20 × HW. Range of other dimensions, HW 0·42–0·50, CI 79–83, SL 0·36–0·44, SI 80–90 137

— Eyes averaging larger, the maximum diameter 0·20–0·25 × HW. Range of other dimensions, HW 0·35–0·42, CI 73–78, SL 0·32–0·40, SI 89–98. If HW > 0·40 and SL > 0·36 then the scapes are longer (SI 95–98) and the eyes are larger (0·24–0·25 × HW) 138

137 Petiole shaped as in Fig. 81, with a small narrow ventral process. Metanotal groove deeply impressed and broad, traversed by long cross-ribs. Anteriorly projecting median portion of clypeus narrow, the carinae close together and only feebly divergent anteriorly. Yellow species. (South Africa) ..... ***rhopalocerum*** (p. 407)

— Petiole shaped as in Fig. 89, with a larger deeper ventral process. Metanotal groove shallowly impressed and narrow, with short cross-ribs. Anteriorly projecting median portion of clypeus broad, the carinae wide apart and broadly divergent anteriorly. Brown species. (South Africa) ..... ***paternum*** (p. 405)

138 Petiole node in profile high and narrow, the anterior face distinctly concave and the posterior convex (Fig. 80). HW 0·40–0·42, SL 0·39–0·40, SI 95–98; maximum diameter of eye 0·24–0·25 × HW. (South Africa) ..... ***tablense*** (p. 414)

— Petiole node in profile broad, the anterior and posterior faces about equally sloped, the former not concave (Figs 77, 79). HW 0·35–0·39, SL 0·32–0·35, SI 89–94; maximum diameter of eye 0·20–0·23 × HW 139

139 With alitrunk in profile the metanotal groove scarcely impressed and the promesonotal dorsum sloping gradually to the site of the groove, the promesonotum and propodeum not forming a

pair of sharply separated convexities. (Zimbabwe) ..... ***nuptualis*** (p. 403)
— With alitrunk in profile the metanotal groove broad and deep so that the promesonotum and propodeum form a pair of sharply separated convexities (Figs 77, 79) 140
140 Petiole node in profile low and more bluntly rounded above; outline shape of alitrunk and petiole as Fig. 79. Promesonotal dorsum with 3 pairs of standing hairs. (Zimbabwe) ***symmotu*** (p. 414)
— Petiole node in profile higher and conical, narrowly rounded above; outline shape of alitrunk and petiole as Fig. 77. Promesonotal dorsum with 4 or more pairs of standing hairs. (South Africa) ..... ***exchao*** (p. 387)
141 Promesonotum with a single pair of standing hairs, situated at the humeral angles. Petiole node very low and broadly rounded, subglobular, the peduncle with a minute inconspicuous anteroventral process. (South Africa) ..... ***braunsi*** (p. 382)
— Promesonotum with 3–5 pairs of standing hairs. Petiole node subconical, the peduncle usually with a small but distinct anteroventral process 142
142 Median projecting portion of anterior clypeal margin forming a sharply defined subrectangular prominence in full-face view. (Ethiopia) ..... ***pallidipes*** (p. 405)
— Median projecting portion of anterior clypeal margin rounded, not forming a sharply defined subrectangular prominence in full-face view 143
143 Minute species with small eyes, HL 0·38–0·40, HW 0·30–0·32, SL 0·24–0·25; maximum diameter of eye 0·19 × HW. (South Africa) ..... ***mavide*** (p. 400)
— Larger species with larger eyes, HL 0·42–0·45, HW 0·32–0·35, SL 0·26–0·28; maximum diameter of eye 0·20 × HW or more 144
144 Uniformly yellow species with SI 81–84 and maximum diameter of eye 0·22–0·24 × HW. (South Africa) ..... ***musicum*** (p. 402)
— Uniformly dark brown species with SI 76–80 and maximum diameter of eye 0·20–0·21 × HW. (South Africa) ..... ***torvicte*** (p. 416)
145 Dorsal alitrunk without standing hairs. (Lesotho) ..... ***guillarmodi*** (p. 392)
— Dorsal alitrunk with one or more pairs of standing hairs 146
146 In full-face view the antennal scapes, when laid straight back from their insertions, surpassing the occipital margin; SI 95–102. (Gabon, Zaire, Uganda, Central African Republic, Tanzania) ..... ***strangulatum*** (p. 413)
— In full-face view the antennal scapes, when laid straight back from their insertions, conspicuously failing to reach the occipital margin; SI usually <95 147
147 Head, alitrunk and gaster glossy dark brown, the legs off-white and with a bleached appearance, contrasting very strongly with the dark body. (Gabon) ..... ***spectrum*** (p. 411)
— Head and body variously coloured but never dark brown contrasting with bleached-white legs 148
148 Petiole in profile with a high sharply wedge-shaped node and a very short anterior peduncle; subpetiolar process relatively large. Postpetiole node high and somewhat anteroposteriorly compressed, narrowly rounded above. (Ivory Coast, Ghana, Cameroun) ..... ***dolatu*** (p. 384)
— Petiole in profile either not high and wedge-shaped or with an elongate anterior peduncle, or both. Subpetiolar process variable but postpetiole node low and not anteroposteriorly compressed 149
149 In profile the postpetiole node as large as or only fractionally smaller than the petiole node. Posterior face of postpetiole node in profile with a long shallow slope (Fig. 92). SI 85–95 150
— In profile the postpetiole node distinctly much smaller than the petiole node, or the posterior face of the postpetiole node in profile not a long shallow slope, or usually both. SI 74–87 152
150 Blackish brown to jet black species. (Senegal, Ghana, Nigeria, Zaire, Kenya) ..... ***rosae*** (p. 408)
— Yellowish brown to light brown species 151
151 Nodes of petiole and postpetiole in dorsal view broader than long. HL 0·46–0·48, SL 0·32–0·34, CI 78–82, SI 87–92. (Zimbabwe) ..... ***pulchrum*** (p. 406)
— Nodes of petiole and postpetiole in dorsal view longer than broad. HL 0·50, SL 0·36, CI 76, SI 95. (Zaire) ..... ***bequaerti*** (p. 379)
152 Pronotal dorsum with a pair of long erect hairs at the humeri, without a similar pair of hairs on the anterior pronotal margin between the humeral pair 153
— Pronotal dorsum with a pair of long erect hairs at the humeri, also with a similar pair of hairs on the anterior pronotal margin between the humeral pair 155
153 Somewhat larger brown species, HW 0·34–0·38, SL 0·28–0·31, PW 0·23–0·26 (CI 80–83). With eye in profile the outer ring of ommatidia enclosing either 3 longitudinal rows of ommatidia, or enclosing 2 rows plus a few other ommatidia. (South Africa) ..... ***taedium*** (p. 415)

— Somewhat smaller yellow species, HW 0·26–0·33, SL 0·20–0·28, PW 0·16–0·21 (CI 72–79). With eye in profile the outer ring of ommatidia enclosing only a single longitudinal row of ommatidia, or enclosing at most a single row plus a couple of other ommatidia 154

154 Minute species, HW 0·26–0·30 (CI 72–76), SL 0·20–0·26, PW 0·16–0·19. Head capsule in profile markedly depressed, the ventral surface flat and not more convex than the dorsal. (Ethiopia, Sudan, Kenya, Zimbabwe, Angola, Namibia) ..... ***mictilis*** (p. 401)

— Slightly larger species, HW 0·32–0·33 (CI 76–79), SL 0·26–0·28, PW 0·20–0·21. Head capsule in profile not markedly depressed, the ventral surface convex, usually more convex than the dorsum. (South Africa) ..... ***fastidium*** (p. 389)

155 Anterior half of pronotal dorsum with a clump of 4 or more pairs of standing hairs. (Nigeria, Kenya, Zaire, Botswana, South Africa) ..... ***vaguum*** (p. 418)

— Anterior half of pronotal dorsum lacking a clump of 4 or more pairs of standing hairs; usually with only the anteromedian and humeral pairs present but sometimes the pronotum with a third pair set farther back. (Ethiopia, Kenya, Zimbabwe, Ivory Coast, Ghana, Nigeria, Cameroun, Gabon, Zaire) ..... ***exiguum*** (p. 388)

The *scabriceps*-group

(Figs 19–21, 26, 31–33)

Worker. Polymorphic with marked variation in size (HW *ca* 0·60–>2·60 in the group), showing monophasic allometric variation. Palp formula 2,2 (*glabrum*, *abyssinicum*, *scabriceps*, *dentigerum*). Mandibles massive and strongly curved, with rugulose to coarse rugose sculpture; trulleum open and relatively large. Mandibles armed with 3 or 4 teeth, when 4 the basalmost is reduced to a minute offset denticle or even a blunt angle. Raised median portion of clypeus weakly to acutely bicarinate, the carinae outcurved or strongly divergent anteriorly. Median portion of clypeus short, not projecting forwards anteromedially, the margin of the median portion concave. Anterior clypeal margin armed with a pair of teeth or tubercles. Posteriorly the median portion of the clypeus broader than either of the frontal lobes where it passes between them. Cephalic dorsal sculpture variable but lateral portions of the clypeus, the area immediately behind the clypeus, and the area around the antennal fossae with striolate or costulate sculpture present (less distinct in smaller workers). Side of head between mandibular base and eye usually longitudinally striate or costulate. Eyes small to moderate, always with more than two ommatidia, situated at or slightly in front of the midlength of the sides. Eyes not markedly oblique with respect to the long axis of the head, and never reniform. Head short and broad, CI 86–100 in *abyssinicum* and may exceed CI 100 elsewhere in the group; CI increases with increased worker size. Scapes with SI 55–110 (*abyssinicum*), decreasing in relative length with increased body size. Antennae 12-segmented, without a strongly differentiated club. Either the funicular segments gradually increase in size apically or the terminal 3–4 segments form a weakly defined club. Standing pilosity present or absent on dorsal alitrunk and gaster. Propodeal dorsum sculptured, the sculpture usually transverse but sometimes disorganized or faint. Propodeal spiracle an elongate ellipse or short slit, orientation of its orifice vertical or nearly so. Propodeum rounded to bluntly angular between dorsum and declivity. Petiolar spiracle on the peduncle, usually at or close to its midlength. (Workers examined: *abyssinicum*, *glabrum*, *criniceps*, *scabriceps*, *dentigerum*, plus two indeterminate species.)

Female. Size only slightly greater than that of the largest conspecific worker but female head smaller and gaster larger than in largest worker. Characters generally as worker but CI tending to be 100 or more. Ocelli present and eyes larger than in conspecific worker. Alitrunk with full complement of flight sclerites and alate when virgin. HW about equal to the maximum width of the mesoscutum or greater, the latter as long as or slightly longer than broad. Parapsidal furrows long and distinct. Pronotum not forming a part of the dorsal alitrunk but in dorsal view visible as a narrow anterior collar. Axillae linked by glossy thin cuticle, appearing to extend across the entire width of the dorsum. Propodeal spiracle usually more ovate than in workers, less obviously slit-like. Forewings with cross-vein *m-cu* present or absent. In some females *m-cu* present on one wing but absent from the other. (Females examined: *abyssinicum*, *criniceps*, *glabrum*, *scabriceps*.)

Male. Very much smaller than conspecific female. Mandibles narrow and bidentate or with an additional minute basal denticle. Palp formula 2,2 (*abyssinicum*, *criniceps*, one indeterminate species). Antennae 13-segmented and whip-like, the scape extremely short and globular to subglobular, the first funicular segment globular, the remaining funicular segments tapering to the apex. Eyes large and situated far forward on the sides, their anterior margins touching or even slightly overlapping the clypeus (Fig. 26).

Sides of head behind eyes relatively long and forming a sort of turret which accommodates the very large ocelli. In full-face view the ocelli break the outline of the occipital margin. Head not much broader behind the eyes than in front of them and the maximum head width much less than the width of the mesoscutum. Sculpture of head feeble to virtually absent. Pronotum not present on dorsal alitrunk, the mesoscutum broader than long to slightly longer than broad. Notauli absent and parapsidal furrows faint to vestigial. Mesoscutellum broader than long, axillae extending right across dorsum as in females. Propodeum very broad in dorsal view and the spiracle far forward. Alitrunk unsculptured. Venation as in female. Genitalia partially exserted, not bizzarly modified. (Males examined: *abyssinicum*, *criniceps*, *glabrum*, *scabriceps*.)

A small group of very distinctive ground-nesting polymorphic species which are strictly granivorous (Rothney, 1889; Bingham, 1903), and which contains some of the largest species included in *Monomorium* (worker TL up to 8·0). Most described species are confined to the Oriental region (*criniceps* (Mayr), *glabrum* (André), *muticum* (Emery), *rogeri* (Mayr), *scabriceps* (Mayr), and perhaps *wroughtonianum* Ettershank), but there is a single species in the Palaearctic region around the eastern Mediterranean (*dentigerum* (Roger)) and a single representative of the group in the Afrotropical region (*abyssinicum*) which is distributed throughout the Sahelian zone.

Members of this group were regarded as constituting a separate genus (*Holcomyrmex*) by Bingham (1903) and earlier workers, the species being separated from *Monomorium* by their lack of a strongly defined antennal club and polymorphic workers. Following Emery's (1908*b*) reduction of *Holcomyrmex* to a species-group of *Monomorium*, both Wheeler (1922) and Emery (1922) treated *Holcomyrmex* as a subgenus of *Monomorium*, defining it by saying that the worker antennal club was short and poorly defined, the workers were strongly dimorphic, and that the male antennae consisted of a short scape, globular first funicular segment, and rapidly tapering remainder of the funiculus. These males are in fact the same as those of the closely related *destructor*-group (see p. 323). Ettershank (1966) did not consider these characters consistent enough or sufficiently strong to maintain *Holcomyrmex* as separate, even at subgenus level. He relegated the name to the synonymy of *Monomorium*, where it remains today.

Emery's (1922: 181) catalogue of *scabriceps*-group members includes a couple of names which should be excluded from the group. *M. whitei* Wheeler, from Australia, which belongs to a peculiarly Australian group of granivores, and *evansi* Donisthorpe from Iraq. Ettershank (1966) placed *whitei* in *Chelaner* but left *evansi* in the *scabriceps*-group. Superficially the workers of *evansi* are similar to those of the *scabriceps*-group but these similarities are certainly convergently acquired. *M. evansi* workers differ from *scabriceps*-group members by being monomorphic, lacking allometric variation in such ratios as SI : HW. The strongly bidentate clypeus of *evansi* is prominent medially, rather than reduced and short as in *scabriceps* and allies, and the eyes are elongate ellipsoid. The antennal club of *evansi* is strongly defined, the propodeal spiracle is circular and the propodeum unsculptured dorsally. The petiolar spiracle is at the node rather than near the midlength of the peduncle. The very large male of *evansi*, which is almost as large as the female and very much larger than the workers, bears no resemblance to males of the *scabriceps*-group. It appears to be a very specialized derivative from the *salomonis-setuliferum* line but with many unique modifications including broad blade-like powerful bidentate mandibles and a greatly expanded plate-like final gastral tergite which is strongly reflexed ventrally.

The species-group closest related to the *scabriceps*-group is the *destructor*-group. Males of the two have identical diagnostic characters at species-group level but in females and workers *destructor*-group members have the anterior clypeal margin unarmed and have the propodeal spiracle circular.

Monomorium abyssinicum (Forel)

(Figs 31–33)

Holcomyrmex abyssinicus Forel, 1894*a*: 83. Syntype workers, Ethiopia: 'Sudabessinien' (*Ilg*) (MHN) [examined].
Monomorium (Holcomyrmex) abyssinicum (Forel) Forel, 1910*c*: 250.

Worker. TL 2·6–6·7, HL 0·68–2·04, HW 0·60–1·94, CI 86–100, SL 0·50–1·06, SI 55–110, PW 0·38–0·90, AL 0·72–1·74 (40 measured).

Workers in any series showing remarkable size variation and exhibiting simple monophasic allometry. Mandibles longitudinally rugose, armed with 3 teeth; sometimes also with a minute offset basal denticle or blunt angle following the basal tooth. In larger workers the 3 teeth sometimes blunted or worn away. Anterior clypeal margin concave medially between a pair of prominent teeth which are situated on the margin in front of the antennal insertions. These teeth tend to be relatively larger, longer and more acute in small workers than in large ones. Eyes set slightly in front of the midlength of the sides, the maximum

diameter of the eye 0·14–0·24 × HW; the relative size of the eye decreasing with increased head size. Relative length of scape decreasing with increased head size, as follows.

When HW < 0·70 then SI is >90;
when HW 0·70–1·00 then SI 88–75;
when HW 1·00–1·30 then SI 75–66;
when HW 1·30–1·60 then SI 66–58;
when HW 1·60–>1·90 then SI 58–55.

In large workers the head in full-face view with the sides approximately straight and more or less parallel; in small workers the sides of the head diverging anteriorly. With alitrunk in profile the metanotal groove impressed. Propodeal spiracle a vertical or near-vertical ellipse of slit. Petiolar peduncle with a conspicuous anteroventral process which when best developed consists of a triangular lamella followed by a broad flange. This process varies considerably in shape and size between series, and between differently sized members of the same series. At its most reduced the process appears as an elongate flange with a rounded anteroventral angle. Petiolar spiracle at or close to the midlength of the peduncle. Elongate standing hairs sparse on cephalic dorsum in large workers, may be absent in smallest individuals. Entire dorsum of head with short decumbent to appressed pubescence, relatively sparse and directed towards the midline. Dorsal alitrunk with numerous standing hairs in largest workers but these may be absent from the propodeum in small workers. In the very smallest individuals the promesonotum may also lack standing hairs. Petiole, postpetiole and gaster with sparse backward directed hairs and with decumbent to appressed moderately dense pubescence. Dorsum of head behind the costulate or rugulose clypeal region utterly smooth and featureless between scattered hair-pits. In all workers except the very smallest the area on the side of the head between the eye and the clypeus with longitudinal costulae or rugulae. Promesonotal dorsum longitudinally rugulose or with disorganized rugulae, to smooth. Sometimes with a few widely scattered punctulate patches or faint rugular vestiges. In general larger workers are more strongly sculptured than smaller workers. Propodeal dorsum transversely to obliquely rugulose in large to medium workers, the rugulae becoming weak and irregular with reduced size, almost obliterated in the smallest. In the range from largest to smallest workers punctate sculpture usually becomes more apparent with decreasing size on the propodeal dorsum. Sides of alitrunk sculptured, again the density and intensity diminishing with decreasing size. First gastral tergite unsculptured in all sizes. Colour varying between series and between individuals of different sizes in the same series. Large to medium workers varying from reddish brown to dark brown with a reddish tint, sometimes with reddish black areas on the head and alitrunk. Gaster darker than head and alitrunk, usually blackish brown to black. Smallest workers much lighter in colour, with the head and alitrunk dull yellowish brown to light brown and the gaster darker in shade.

This very conspicuous species ranges across the entire Sahelian zone of the Afrotropical region. Apart from the fact that it is granivorous and nests in the ground, nothing is known of its biology.

Material examined

Ethiopia: no loc. (*Ilg*). **Sudan**: Kadugli area (*C. Sweeney*). **Burkina Faso**: Ougadougou (*P. Room*). **Ghana**: Amfeda (*C. A. Collingwood*). **Nigeria**: Mokwa (*C. Longhurst*).

The *destructor*-group

(Figs 19–21, 26, 34, 35, 39–41)

Worker. Monomorphic to weakly polymorphic, usually with marked variation in worker size and frequently exhibiting monophasic allometry. Mandibles usually sculptured, sometimes smooth; may be less distinctly sculptured in small than in large workers. Trulleum relatively large and open, only narrowly so in some. Mandibles usually with 4 teeth, less commonly with 3. When 4-dentate the basal tooth is reduced to a minute offset denticle or small angular prominence which is usually distinctly separated from the three main teeth; denticle sometimes lost in smallest workers. Palp formula 2,2. Anterior clypeal margin unarmed, without a pair of projecting teeth. Median portion of clypeus raised, weakly longitudinally bicarinate to rounded, the carinae or rounded edges broadly divergent anteriorly. Median portion of clypeus not sharply projecting forward anteromedially, its free margin shallowly convex to broadly concave. Posteriorly the median portion of the clypeus is broader than either of the frontal lobes where it passes between them. Eyes relatively small but distinct (maximum diameter 0·13–0·20 × HW), situated in front of the midlength of the sides and never reniform. Sculpture of cephalic dorsum variable. Lateral portions of clypeus, area immediately behind clypeus and area around antennal fossae with fine striae or costulae; all sculpture fainter in smaller individuals. Head relatively short and broad (CI 80–97), the scapes short (SI 78–89). In weakly polymorphic species the scapes of smaller workers are relatively longer than those of larger individuals, and in larger workers the scapes when laid straight back from their insertions

fall far short of the occipital margin. Antennae with 12 segments, with a strongly differentiated apical club of 3 or rarely 4 segments. Propodeal dorsum usually transversely sculptured even if only feebly so, sometimes the transverse pattern masked or replaced by dense punctation. Dorsal alitrunk and gaster with numerous standing hairs present. Propodeal spiracle circular to subcircular and the propodeum rounded between dorsum and declivity. Petiolar spiracle at or immediately in front of the anterior face of the node. Venom of sting lacking alkaloids. (Workers examined: all included in this study plus *lameerei*, *chobauti*, *santschianum*, *aberrans*.)

FEMALE. Larger than largest conspecific worker, most characters as worker. Head with larger eyes and with ocelli present. Alitrunk with full complement of flight sclerites, alate when virgin. HW slightly less than to slightly greater than the width of the mesoscutum, the latter as long as broad or slightly longer than broad. Pronotum not forming part of dorsal alitrunk, visible as a narrow collar anteriorly. Parapsidal furrows faint to vestigial. Axillae forming a continuous strip of thin cuticle across the width of the dorsum. Wings with cross-vein *m-cu* usually absent, only rarely present. (Females examined: *destructor*, *emeryi*, *mayri*, *oscaris*.)

MALE. Very much smaller than conspecific female. Mandibles narrow and with 2–3 teeth. Palp formula 2,2. Antennae 13-segmented and whip-like, the funicular segments after the first tapering apically. Scape very short, only fractionally longer than broad, or subglobular to globular; first funicular segment globular (Fig. 26). Eyes very large, situated far forward on the sides, their anterior margins in contact with the lateral portions of the clypeus or even slightly overlapping them. Sides of head behind eyes long and forming a turret which accommodates the very large ocelli. In full-face view the ocelli break the occipital margin outline. Head not much broader behind eyes than in front of them and maximum head width much less than width of the mesoscutum. Head and alitrunk not predominantly reticulate-punctate nor shagreenate everywhere. Notauli absent from mesoscutum and parapsidal furrows faint. Axillae extending across dorsum as a continuous thin cuticular strip. Venation as female. Genitalia partially exserted, not bizarrely modified. (Males examined: *destructor*, *emeryi*, *mayri*, *oscaris*, *chobauti*, *santschianum*.)

With 6 species represented in the Afrotropical region and several extralimital members in the Palaearctic and Oriental regions, the *destructor*-group forms the core of the old subgenus *Parholcomyrmex*. The members of the group are mostly predators and scavengers though one peripheral species, *chobauti*, is a granivore.

Most of the Afrotropical species now included in the *destructor*-group appear under *Parholcomyrmex* in Wheeler's (1922: 873) catalogue in one form or another, but *oscaris* and *emeryi* are conspicuous by their absence, having been placed in *Monomorium s.str.* by Wheeler despite the fact that Arnold (1916) had pointed out that *emeryi* had a male characteristic of this group (Arnold (1944) later shifted *emeryi* into the group), and Forel (1894*a*) had stated that *oscaris* was close to *destructor*.

A couple more corrections to the catalogue, as regards this group, are as follows. *M. amblyops* Emery, a name figuring in Wheeler's catalogue, is a South American species correctly referred to the genus *Tranopelta*. Forel (1914, 1916) mistakenly appended some African *Monomorium* as infraspecific forms of this species, to which they are not at all related.

M. australe was transferred into the *destructor*-group by Santschi (1917) based on a misidentification of *australe* and his mistaken association of *australe* with *havilandi*. It was retained in the *destructor*-group by both Wheeler (1922) and Emery (1922), but it is now known that neither *australe* nor *havilandi* is correctly placed here. The former belongs in the *salomonis*-group and the latter in the *setuliferum*-group.

The Afrotropical species fall into two complexes, the first of which (including *emeryi* and *robustior*) does not show marked monophasic allometric variation in the worker caste but which may (*robustior*) or may not (*emeryi*) have conspicuous size variation in any worker series. The second complex, which contains *destructor*, *oscaris*, *epinotale* and *mayri*, shows marked monophasic allometric variation in the worker caste and exhibits conspicuous size variation in any worker series.

At species-group level the *destructor*-group is very close to the *scabriceps*-group and the two probably shared a common ancestor in the relatively recent past. The very characteristic males are identical in both groups but female castes are separated by the presence of clypeal teeth and an elliptical or slit-shaped propodeal spiracle in the *scabriceps*-group.

Recent work by Jones *et al.* (1982) and Blum *et al.* (1985) indicates that only the *destructor*-group of *Monomorium* lacks alkaloids of any form as a fraction of the sting venom but has phenol and salicylaldehyde, fractions not previously known in ants. Relatively few species of this very large genus have been investigated for venom constituents as yet, but these studies may provide much new information concerning the relationships of various species-groups within the genus. For a synopsis of what is known of the chemical components of ant venoms see Blum (1985).

Monomorium destructor (Jerdon)

(Fig. 39)

Atta destructor Jerdon, 1851: 105. Syntype workers, India (*T. C. Jerdon*) (no types known to exist).
Myrmica ominosa Gerstäcker, 1858: 263. Syntype workers, 'East Africa', no further data (no types known to exist). [Synonymy by Dalla Torre, 1893: 66.]
Myrmica atomaria Gerstäcker, 1858: 263. Syntype workers, 'East Africa', no further data (no types known to exist). [Synonymized with *ominosa* by Roger, 1863*b*: 31.]
Myrmica basalis Smith, 1858: 125. Syntype workers, Sri Lanka (BMNH) [examined]. [Synonymy by Forel, 1894: 86.]
Myrmica gracillima Smith, 1861*a*: 34. Holotype worker, Israel (*Hooker & Hanbury*) (not in BMNH or UM, presumed lost). **Syn. n.**
Myrmica vexator Smith, 1861*b*: 47. Syntype workers, Indonesia: Ternate I., no. 21 (*A. R. Wallace*) (UM) [examined]. [Synonymy by Donisthorpe, 1932: 468.]
Monomorium destructor (Jerdon) Dalla Torre, 1893: 66.

Worker. TL 1·8–3·5, HL 0·50–0·88, HW 0·40–0·79, CI 76–92, SL 0·41–0·56, SI 70–104, PW 0·23–0·45, AL 0·54–0·92 (55 measured).

Workers showing marked size variation in any given series, and displaying monophasic allometric variation. Mandibles with 3 strong teeth, the fourth (basal) reduced to a minute offset denticle. Mandibles usually with distinct longitudinal rugulose or striate sculpture, even in the smallest workers. Only rarely the smallest workers with mandibles virtually smooth. Eyes relatively small, the maximum diameter 0·14–0·20 × HW and with 4–6 ommatidia in the longest row. In general eyes of smaller workers relatively somewhat larger in relation to head width than in larger workers, but not as conspicuously so as in *oscaris*. In larger workers CI is higher than in smaller workers, the heads becoming relatively broader with increased size. Antennal scapes relatively longer in small workers and shorter in larger individuals, as follows.

When HW 0·40–0·45 then SI is 104–95;
when HW 0·45–0·55 then SI is 97–85;
when HW 0·55–0·65 then SI is 86–76;
when HW 0·65–0·79 then SI is 78–70.

Note that within the size intervals given the scapes are always relatively longer here than in *oscaris* (see below). Scapes when laid straight back from their insertions reaching the occipital margin in smallest workers but falling short of the margin in larger individuals. Alitrunk in profile with promesonotum convex and metanotal groove impressed. Petiole node in dorsal view globular to subglobular, not distinctly anteroposteriorly compressed. Occipital margin of head with 2–4 pairs of hairs forming a transverse row. Dorsum of head in front of this row but behind the frontal lobes with 1–4 pairs of hairs straddling the midline. Pubescence on head sparse and directed towards the midline. Promesonotal dorsum always with numerous elongate standing hairs; such hairs usually present on propodeum but may be lacking in small workers. Petiole, postpetiole and gaster with backward directed elongate hairs. Cephalic dorsum unsculptured except for scattered hair-pits. A band of fine transverse striolate sculpture present on the rim of the descending occipital surface of the head; this band of weak sculpture usually just visible in full-face view along the rim of the occipital margin. In the smallest workers this sculpture may be very faint or rarely even absent. Propodeal dorsum always finely transversely striolate to rugulose and usually with punctulate sculpture also present, at least in larger workers of any given series. The transverse sculpture is fainter in smaller than in larger workers but the overall intensity of the sculpture may vary between series. Promesonotum usually smooth and shining with scattered hair-pits, but peripheral faint sculpture may occur in large workers. Sides of pronotum smooth to vestigially striolate, the remainder of the sides of the alitrunk punctate to reticulate-punctate; the sculpture more intense and wider distributed in larger than in smaller workers. First gastral tergite smooth except for hair-pits. Head, alitrunk, petiole and postpetiole uniformly glossy yellow, varying in shade from light yellow to dull brownish yellow. Gaster always much darker, dark brown to blackish brown, usually with a conspicuous yellowish area mediobasally, the extent of which is very variable but is sometimes absent, leaving the gaster uniformly dark.

A successful tramp-species, most probably of Indian origin, *destructor* is now widely distributed throughout the tropical zones of the world and is increasingly being spread into the temperate zones by commercial activity, where it is able to survive in constantly heated buildings. On describing the species Jerdon (1851) noted that these ants 'prefer animal to vegetable substances, destroying dead insects, bird skins, &c. but also feed greedily on sugar. They are common in all parts of India, and often prove very troublesome and destructive to the naturalist.'

Krombein *et al.* (1979) give a good list of references dealing with the known biology of this species, and

note that *destructor* has 'been reported to gnaw holes in fabrics, rubber goods, remove rubber insulation from electric or telephone wires, and damage polyethylene cable.'

Two closely related species occur in sub-Saharan Africa, *oscaris* and *mayri*. The latter matches the description of *destructor* given above but is uniformly dark brown to blackish brown; see under *mayri* for further discussion. *M. oscaris* is uniformly coloured, unlike *destructor*, and has the petiole and postpetiole shaped differently in larger workers, compare Figs 39, 40. Apart from this the antennal scapes of *destructor* are relatively longer than those of *oscaris* in workers of comparable absolute dimensions, compare the tables given under their respective descriptions.

MATERIAL EXAMINED

Afrotropical region. **South Africa**: Natal, Durban (*G. Arnold*).

Other regions. **Cape Verde Is**: Mindelo (*M.L. Lobo Lima*). **Madagascar**: Maevantanana (*J. M. Wilson*). **Seychelle Is**: Frigate I. (*U. Müller*). **Andaman Is**: North Bay (*G. Rogers*). **Sri Lanka**: Colombo (*B. Laurence*); Peradenya (*A. Rutherford*); Maha-Oyo Dist. (*R. Winney*); no loc. (coll. *F. Smith*). **India**: Calcutta (coll. *F. Smith*); Calicut (*A. P. Rosy*); NE. India, no loc. (*S. P. Kurl*). **Nepal**: Taplejung Dist. (*R. L. Coe*). **Singapore**: Sabang. **Indonesia**: Flores I., Maumere (*W. L. Brown*); Ternate I. (*A. R. Wallace*). **Papua New Guinea**: Saraga (*J. W. Ismay*); Cyclpos Mts, Sabron (*L. E. Cheesman*). **Hawaii** (*R. C. L. Perkins*). **Gilbert Is**: Tarawa (*E. S. Brown*). **Australia**: Qld. (intercepted in quarantine). **Oman** (R. Whitcombe). **Great Britain**: London (*R. A. Lever*); London (*R. Baggerley*). **Puerto Rico**: Ensanda (*M. R. Smith*). **Trinidad** (no data).

Monomorium emeryi Mayr

Monomorium emeryi Mayr, 1895: 132. Syntype workers, MOZAMBIQUE (*H. Brauns*)(NMV) [examined].

WORKER. TL 2·5–3·4, HL 0·68–0·88, HW 0·62–0·80, CI 89–95, SL 0·52–0·67, SI 78–86, PW 0·36–0·50, AL 0·70–1·00 (20 measured).

Mandibles conspicuously longitudinally rugulose to striate-rugulose, the basal tooth reduced to a minute denticle. Eyes relatively small, the maximum diameter 0·16–0·20 × HW and with 6–7 ommatidia in the longest row. Occipital margin in full-face view shallowly concave and somewhat indented medially. Head relatively broad and scapes short (CI and SI above). Promesonotum evenly domed-convex in profile, the metanotal groove shallowly impressed and the propodeal dorsum flat to very feebly convex. Propodeal dorsum on a much lower level than that of promesonotum. Petiole peduncle with an anteroventral low rim or flange. Usually this process runs back approximately to the level of the petiolar spiracle but may be reduced in some workers. Head without elongate standing hairs dorsally behind the level of the frontal lobes, but quite densely clothed with long decumbent to appressed pubescence which is directed towards the dorsal midline. Similar long pubescence present on all surfaces of dorsal alitrunk but also with much longer conspicuous standing hairs present both on promesonotum and propodeum. Long back-curved hairs numerous on petiole, postpetiole and first gastral tergite and sternite; all these segments also with elongate but relatively sparse pubescence which is decumbent to appressed. Entire dorsum of head densely longitudinally costulate to rugulose, the sculpture usually quite regular and always with fairly conspicuous punctures visible between the longitudinal components. On sides of head the sculpture tends to fade out or become much less dense below and behind the eyes. Dorsal alitrunk reticulate-punctate, this sculpture overlaid by fine rugular or costulate sculpture which may vary in density and direction on the promesonotum even in members of a single nest-series, but is always transverse on the propodeal dorsum. Sides of alitrunk with rugular or costulate sculpture usually also present on the pronotum, metapleuron and propodeum. Punctate component sometimes reduced on sides of pronotum so that only faint longitudinal rugulae remain. Rugulae sometimes absent from metapleuron and propodeal sides, leaving the area reticulate-punctate. Petiole and postpetiole generally smooth dorsally but with lateral sculptural vestiges remaining. First gastral tergite unsculptured except for hair-pits. Colour light to dark brown, usually uniform.

This distinctive heavily sculptured species shows very little size variation in any given series and the marked allometric variation characteristic of *oscaris* does not occur. The form and density of the sculpture immediately isolates *emeryi* from all other members of the *destructor*-group. The male of *emeryi*, described by Arnold (1916), is very similar to that of *destructor* and *oscaris* (see p. 323).

MATERIAL EXAMINED

Malawi: Salima Bay (*G. Arnold*). **Zimbabwe**: Victoria Falls (*G. Arnold*); Redbank (*G. Arnold*);

Cawston Farm (*G. Arnold*). **Mozambique**: no loc. (*H. Brauns*). **Botswana**: Okavango Delta, Smiti (*A. Russel-Smith*); Serowe (*P. Forchhammer*).

Monomorium epinotale Santschi

Monomorium (Parholcomyrmex) epinotale Santschi, 1923: 281. Syntype workers, Zaire: Luluaborg, 16.i.1912 (*R. P. Callewaert*) (MNB; MRAC) [examined].

M. epinotale, presently known only from the syntypic series, is exceptionally close to *oscaris*, differing only in colour. When more material is known *epinotale* will most probably fall into the synonymy of *oscaris*. For the present *epinotale* answers the description of *oscaris* in all respects but is coloured as follows.

Head and gaster yellow. Alitrunk chestnut-brown to dark brown. Petiole and postpetiole usually the same colour as the alitrunk but may be slightly lighter; the petiole and postpetiole are, however, always much darker in colour than the gaster.

Material examined

Zaire: Luluaborg (*R. P. Callewaert*).

Monomorium mayri Forel **stat. n.**

(Fig. 34)

Monomorium gracillimum var. *mayri* Forel, 1902*a*: 209. Syntype workers, India (MHN) [examined].

Monomorium destructor r. *gracillimum* var. *karawajewi* Forel, 1913*d*: 437. Syntype workers, Sudan: Khartoum (*Karavaiev*), and Israel: Rehovot, near Tel Aviv-Yafo (Jaffa) (*Aharoni*) (MHN) [examined]. [Unavailable name.]

Answering the description of *destructor* in all respects except colour, *mayri* being uniformly dark brown, sometimes with a paler patch at the base of the first gastral tergite.

I have decided to retain *mayri* as a valid species, separate from *destructor*, for the time being. The colour character is admittedly feeble but appears to be consistent, and *mayri* does not show the tramping ability so strongly developed in *destructor*. Compared to the range of *destructor* (widespread in India and nearby states, and patchily introduced in many other parts of the tropics by man), the range of *mayri* covers a very wide continuous broad band of territory, stretching from east to west. Like *destructor* I suspect the Indian subcontinent of being the place of origin of *mayri*, and westward from there its range extends across the Middle and Near East and through the Sahelian zone of sub-Saharan Africa. Eastwards from India *mayri* is recorded from Thailand and Malaysia.

Material examined

Afrotropical region. **Mali**: Tessalit (*P. Room*). **Niger**: Italemen (*J. Newby*). **Sudan**: Khartoum (*R. Cottam*); Khartoum (*Karavaiev*).

Other regions. **Egypt**: Gara (*J. Omer-Cooper*). **Oman**: Khabura Farm (*R. P. Whitcombe*); Dhofar, Wadi Sayq. **Israel**: Rehovot (*Aharoni*). **Syria**: no loc. (ex coll. Saunders). **Iraq**: Baghdad (*Y. R. Rao*); Baghdad (*P. A. Buxton*); Fatah (*H. D. Peile*). **Saudi Arabia**: Jiddah (*A. C. Trott*); Jiddah (*G. L. Bates*); Mukalla (*H. StJ. B. Philby*). **South Yemen:** Al Huseini (*H. Scott & E. B. Britton*). **India**: Tamil Nadu, Mudumalai (*J. S. Noyes*); Madras. **Sri Lanka**: Peradenya (*Green*). **Thailand**: Chang Khian, Chiang Mai (*D. Jackson*); Bangkok (*H. Hillman*). **West Malaysia**: Sg. Patani (*G. H. Lowe*).

Monomorium oscaris Forel

(Fig. 40)

Monomorium oscaris Forel, 1894*a*: 86. Holotype worker, Ethiopia: 'Sudabessinien' (*Ilg*) (MHN) [examined].

Monomorium dispar Emery, 1895*b*: 24. Syntype workers, South Africa: Transvaal, Makapan (*E. Simon*) (MCSN) [examined]. **Syn. n.**

Rhoptromyrmex solleri Forel, 1910*a*: 430. Holotype female, Senegal: Bissao (*Soller*) (MHN) [examined]. [*solleri* transferred to *Monomorium* by Ettershank & Brown, 1964: 18.] **Syn. n.**

Monomorium destructor subsp. *kalahariense* Forel, 1910*c*: 18. Syntype workers, Botswana: Kalahari, Kooa-Sekgoma (*L. Schultze*) (MHN) [examined]. **Syn. n.**

Monomorium destructor subsp. *kalahariense* var. *despecta* Forel, 1910*d*: 252. Syntype workers, ETHIOPIA: Ghinda (*K. Escherich*) (MHN) [examined]. [Unavailable name.]

Monomorium amblyops r. *bulawayense* Forel, 1914: 247. Syntype workers, ZIMBABWE: Bulawayo, Hillside, 8.ii.1914, no. 270 (*A. M. Macgregor*) (MHN) [examined]. [Junior primary homonym of *M. exiguum* var. *bulawayensis* Forel, 1913*c*: 217.]

Monomorium amblyops r. *prossae* Forel, 1916: 418. [Replacement name for *M. amblyops* r. *bulawayense* Forel, 1914: 247.] **Syn. n.**

WORKER. TL 1·6–3·8, HL 0·46–0·94, HW 0·36–0·84, CI 76–90, SL 0·34–0·54, SI 63–94, PW 0·24–0·52, AL 0·48–1·00 (30 measured).

Workers showing marked size variation in any given series, and displaying monophasic allometric variation. Mandibles with 3 strong teeth, the fourth (basal) tooth reduced to a minute offset denticle or even lost in the smallest workers. Mandibles frequently showing longitudinal rugular sculpture but often smooth. Usually larger workers have the mandibles more strongly sculptured than smaller individuals, but this is by no means universal. Eyes relatively small, the maximum diameter 0·13–0·19 × HW and with 3–6 ommatidia in the longest row. Eyes of larger workers have more ommatidia than those of smaller workers but are smaller in relation to the size of the head. In small workers, with HW < 0·60, the eyes are approximately 0·15–0·19 × HW, whilst in workers with HW > 0.60 the eyes range 0·13–0·16 × HW. In large workers CI is higher than in small, the heads being relatively broader. Antennal scapes relatively longer in small workers and shorter in large workers, as follows.

When HW 0·35–0·45 then SI is 94–84;
when HW 0·45–0·55 then SI is 84–79;
when HW 0·55–0·65 then SI is 76–69;
when HW 0·65–0·75 then SI is 74–64;
when HW 0·75–0·85 then SI is 65–63.

When laid straight back from their insertions the scapes almost reach the occipital margin in smallest workers but fall far short of the margin in the largest individuals. With the head in full-face view the sides shallowly convex and the occipital margin shallowly concave in large workers; in small workers the sides and occipital margin tend to become straighter. Alitrunk in profile with promesonotum convex, the metanotal groove impressed. In dorsal view the petiole node conspicuously anteroposteriorly compressed in large workers, distinctly much broader than long. Postpetiole in dorsal view broader than long. Occipital margin of head with 2–4 or more pairs of standing hairs forming a transverse row. Dorsum of head in front of this row but behind the frontal lobes with 1–4 pairs of standing hairs straddling the midline. Pubescence on head sparse, directed towards the midline. Promesonotal dorsum always with numerous standing hairs; such hairs also present on propodeum in large to medium workers but sometimes absent in small individuals. Petiole, postpetiole and gaster each with numerous elongate backward directed hairs. Sculpture usually absent from cephalic dorsum, the surface glassy smooth between scattered hair-pits. Medium to large workers with a band of fine transverse striolate sculpture on the rim of the descending occipital surface of the head; this band of weak sculpture usually just visible in full-face view along the rim of the occipital margin. In smaller workers this transverse occipital sculpture is much reduced or absent. Largest workers in some West African samples with the cephalic dorsum showing very fine vestiges of sculpture between the hair-pits. Propodeal dorsum always finely transversely striolate to transversely rugulose; fainter in smaller workers than in larger. Promesonotal dorsum usually smooth with scattered hair-pits, but faint scratch-like or patchy striolate sculpture occurs in the large workers of some samples; a small patch of superficial punctulation may occur at the pronotal-mesonotal junction. Sides of pronotum smooth to vestigially striolate, the remainder of the lateral alitrunk punctuate to reticulate-punctate. First gastral tergite smooth except for hair-pits. Colour yellow to light brownish yellow, glossy.

A widely distributed and versatile species which ranges over most of the Afrotropical region outside the rainforest zone or within that zone in cleared areas. Arnold (1916) records that in Zimbabwe it nests under stones along with a small species of termite, but that the galleries of the two are not interconnected. In Nigeria I have found *oscaris* in termitaria and nesting in the earth, but on one occasion a nest was found in an old and rotting cocoa pod which was still attached to the tree, some distance above the ground.

The closest relative of *oscaris* appears to be the pantropical tramp-species *destructor*, but the two are separable by the shape of the petiole node in dorsal view, especially in larger workers (Figs 39, 40). In *destructor* the node is globular to subglobular but in *oscaris* it is strongly anteroposteriorly compressed and markedly transverse. Also, at any given worker size, the scapes tend to be longer in *destructor* than in *oscaris*: compare the tables under their respective descriptions.

It is possible that the names *ominosa* and *atomaria*, both described from East Africa and subsequently

synonymized with *destructor*, may represent early records of *oscaris*. However, as the original descriptions are so poor, and as the specimens involved seemingly have long since disappeared, there is no way of proving this; in consequence they are left undisturbed as junior synonyms of *destructor*. The West African population of *oscaris* may eventually prove to be separable at species-level from the eastern and southern population. Females of the western population, which correspond to the name *solleri* in the above synonymy, are lighter in colour and tend to have the mesoscutum relatively broad. The largest workers from this area tend to show faint cephalic sculpture. The amassing of more material will be necessary before a meaningful analysis of these features can be undertaken.

Material examined

Ghana: Legon (*D. Leston*); Legon (*G. Benson*); Navrongo (*P. Room*); Dawhenya (*C. A. Collingwood*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*); Mokwa (*C. Longhurst*); Ibadan (*R. Ouhang*). **Ethiopia**: Ghinda (*K. Escherich*). **Uganda**: Kawanda (*R. M. C. Williams*). **Zaire**: Yakuluku (*H. O. Lang*). **Tanzania**: Shinyanga (*O. W. Richards*); Tanga, Pituzika (*M. J. Way*). **Zimbabwe**: Bulawayo (*A. M. Macgregor*); Bulawayo (*G. Arnold*); nr Harare (*W. H. S.*). **Botswana**: Kalahari, Kooa-Sekgoma (*L. Schultze*). **South Africa**: Transvaal, Makapan (*E. Simon*).

Monomorium robustior Forel **stat. n.**

(Figs 35, 41)

Monomorium gracillimum r. *robustior* Forel, 1892*a*: 352. Syntype workers, Somalia (*C. Keller*) (MHN) [examined].

[*Monomorium gracillimum* r. *robustius* Forel, 1894*b*: 228. Misspelling of *robustior*.]

Worker. TL 2·5–3·4, HL 0·68–0·84, HW 0·62–0·78, CI 90–97, SL 0·52–0·66, SI 82–88, PW 0·36–0·46, AL 0·70–0·92 (20 measured).

Mandibles strongly longitudinally rugulose, the basal (fourth) tooth reduced to a minute denticle. Maximum diameter of eye 0·18–0·20 × HW and with 6–8 ommatidia in the longest row. Sides of head feebly convex in full-face view, the occipital margin concave or indented medially. Promesonotum domed in profile, the metanotal groove shallowly impressed; propodeal dorsum on a lower level than that of the promesonotum. Cephalic dorsum usually without standing hairs behind the level of the frontal lobes, but in some larger workers a single pair is present straddling the midline close to the occipital margin. Even more rarely a second pair may occur mid-dorsally between the level of the posterior margins of the eyes and the occipital margin. Entire dorsum of head with long fine pubescence which is decumbent to appressed and is directed toward the midline. Dorsal alitrunk also with similar appressed pubescence but all surfaces also with long standing hairs present. Petiole, postpetiole, first gastral tergite and first sternite with numerous long back-curved hairs and with sparse appressed pubescence. Dorsum and sides of head and promesonotum unsculptured, smooth except for small scattered hair-pits. Remainder of sides of alitrunk reticulate-punctate, the metapleuron and propodeal sides usually overlaid by rugular sculpture. Propodeal dorsum finely transversely rugulose, usually with punctate interspaces, the latter variable in intensity. Petiole and postpetiole either with sculptural vestiges laterally or entirely smooth; first gastral tergite unsculptured except for scattered hair-pits. Colour medium to dark brown on the head and alitrunk, sometimes with a reddish tint. Gaster dark brown to blackish brown, usually darker in shade than the head and alitrunk.

M. robustior, an East African and Malagasy species, was originally described as a 'race' of *gracillimum* (the latter now a synonym of *destructor*) by Forel (1892*a*). The colour and habitus of *robustior* approaches that of *mayri* most closely and the species should not be associated with *destructor*.

M. mayri and *robustior* are superficially similar but samples of the latter do not show the extreme variations of worker size seen in the former. Apart from this the occipital area of the head is smooth in *robustior* but has faint transverse rugulose sculpture in *mayri* (and also in *destructor*). The transverse rugular sculpture on the propodeal dorsum tends to be fine and dense in *mayri*, coarse and more broadly spaced in *robustior*. The occipital margin of the head has a transverse row of 4–6 standing hairs in *mayri* where at most 1 pair, and usually none, occurs in *robustior*. The eyes of *robustior* average larger than those of *mayri* or *destructor* (see measurements under the latter name), and the hairs on the first gastral tergite are much longer and more strongly curved in *robustior* than in either *destructor* or *mayri*; compare Figs 34, 35.

MATERIAL EXAMINED

Somalia: no loc. (*C. Keller*). **Kenya**: Amboseli (*E. S. Brown*); Kajiado (*G. Nyamasyo*); Kora (*C. West*); Kora (*N. M. Collins & M. Ritchie*). **Madagascar**: Amboasary (*J. M. Wilson*); Bereboka, nr Morondava (*J. S. Noyes & M. C. Day*); Bereboka (*W. L. Brown*); Betroka (*E. S. Ross & R. E. Leech*).

The *salomonis*-group

(Figs 22, 24, 25, 27–30, 36–38, 42–56, 60)

WORKER. Monomorphic, usually with some size variation in any series but without allometric variation. Palp formula 2,2 (*albopilosum*, *areniphilum*, *afrum*, *bicolor*, *damarense*, *drapenum*, *indicum*, *junodi*, *minor*, *niloticum*, *marshi*, *pharaonis*, *rufulum*, *salomonis*, *subopacum*, *sutu*, *viator*, *westi*), reduced to PF 1,2 in some minute species (*osiridis*, *rabirium*, by *in situ* count) and in the socially parasitic *noualhieri*. Mandibles sculptured except in a few, usually very small, species. Masticatory margins of mandibles with 4 teeth which decrease in size from apex to base, the basal tooth not reduced to a minute denticle except in *rufulum*. Trulleum small to obliterated, when present either open or closed. Median portion of clypeus raised, projecting forward anteriorly, bicarinate to rounded along lateral margins of raised portion. Median portion of clypeus posteriorly broader than either of the frontal lobes where it passes between them. Anterior clypeal margin without a widely separated pair of teeth although anterior ends of clypeal carinae may be denticulate or sharply pointed in some species. Cephalic dorsum usually sculptured (not so in only a very few species), the sculpture ranging from dense blanketing reticulate-punctuation to faint superficial reticular patterning. Eyes distinct and moderate to large in size (0·19–0·40 × HW), generally with 6 or more ommatidia in the longest row; eyes situated at or very close to the midlengths of the sides of the head. Eyes circular to roughly oval, never reniform nor extended anteroventrally into a lobe. Head always longer than broad (CI < 90) and scapes usually relatively long (SI > 90, with very few exceptions). Antennae with 12 segments, terminating in a club of 3 segments. Metanotal groove moderately impressed to absent. Metanotal cross-ribs inconspicuous to absent; when present often short and masked by other sculpture. Propodeal spiracle circular to subcircular. Propodeum rounded to angular between dorsum and declivity, rarely the angle weakly dentate. Propodeal dorsum usually sculptured but never transversely striate; only very rarely the dorsum smooth. Petiolar spiracle at the node or immediately in front of the anterior face of the node. Body pilosity very variable in distribution and density, but with a marked tendency to reduce the pilosity, especially on the head and alitrunk. Alitrunk, petiole and postpetiole usually conspicuously sculptured. First gastral tergite frequently shagreenate or otherwise finely sculptured. (Workers examined: all included in this revision plus the following extralimital species. *M. albeillei*, *algiricum*, *buxtoni*, *dichroum*, *hesperium*, *indicum*, *longi*, *medinae*, *niloticum*, *pallidum*, *salomonis*, *schurri*, *subnitidum*, *venustum*, *wroughtoni*, plus 12 indeterminate species.)

FEMALE. Characters generally as worker but female much larger; only slightly larger than the conspecific male. Eyes usually larger than in worker, at or only slightly behind midlength of sides. Ocelli present except in extreme ergatoids where the eyes are also reduced to worker-size. Antennae with 12 segments, the apical club of 3 segments or rarely of 4 (*effractor*, *santschii*). In *afrum* the club is feebly 4-segmented as the eighth funicular segment is moderately enlarged. HW slightly to very distinctly greater than maximum width of mesoscutum. In very few females the two of about equal width but in ergatoids the head conspicuously wider than the mesoscutum. Alitrunk usually winged in virgins and with a full complement of flight sclerites, but several apterous or ergatoid forms are known which fail to develop wings and show a serial reduction of flight sclerites. (Apterous to ergatoid females are known in *bicolor*, *albopilosum*, *rufulum*, *venustum*, *opacior*, *medinae*, *minor*, *hesperium*, *dichroum*, *advena*, *algiricum*, *damarense*, *biroi*, *grassei*, *libanicum*, *syriacum*, of which the last seven are extreme ergatoids.) A few species are known which may produce both apterous and alate females. Mesoscutum very prominent and bulging anteriorly in some known or suspected social parasites (*afrum*, *effractor*, *santschii*), strongly overhanging the pronotum. Parapsidal grooves varying from conspicuous to absent. Axillae usually triangular in alate forms, separated mid-dorsally by a small gap. Axillae fused to mesoscutum in many apterous and ergatoid forms. Petiole and postpetiole varying from subconical and nodiform respectively to both strongly anteroposteriorly compressed. Forewings with cross-vein *m-cu* absent. Head and alitrunk conspicuously sculptured; first gastral tergite usually also sculptured, even if only faintly so. (Females examined: *advena*, *afrum*, *albopilosum*, *algiricum*, *areniphilum*, *bicolor*, *damarense*, *delagoense*, *dichroum*, *dictator*, *effractor*, *herero*, *hesperium*, *indicum*, *junodi*, *medinae*, *minor*, *ocellatum*, *opacior*, *pharaonis*, *rufulum*, *salomonis*, *santschii*, *subdentatum*, *subnitidum*, *subopacum*, *venustum*.)

MALE. About same size as or slightly smaller than conspecific female, much larger than worker. Palp formula 2,2 in all examined (perhaps reducing to PF 1,2 in minute species). Mandibles strongly developed and 4-dentate except in *pharaonis*-complex where they are relatively small and have 2-3 teeth. Scape cylindrical or subcylindrical, varying in length but usually quite short, about equal in length to funiculus segment 2, or slightly longer. First funicular segment not globular, remaining funicular segments not whip-like, but tapering apically in *excelsior*. Head capsule wider behind eyes than in front, maximum width of head about equal to maximum width of mesoscutum. Eyes large and approximately at midlength of sides; always a distinct space between the eye and the mandible, the eye not touching the clypeus. Ocelli large, not born on a turret and not breaking the outline of the occipital margin. Mesoscutum overhanging pronotum anteriorly, strongly produced and bulging forward in socially parasitic species (*effractor*, *santschii*). Notauli absent but mesoscutum with a narrow V-shaped anteromedian area which is only weakly sculptured or is smooth. Parapsidal grooves present to absent. Axillae small, triangular in dorsal view and separated dorsally by a groove; axillae usually fused to scutellum, sometimes also fused to mesoscutum. Propodeal spiracle far forward, in front of midlength of sclerite. Wings present in all known males, with cross-vein *m-cu* absent. Head and alitrunk sculptured, usually densely so. Predominant sculpture is reticulate-punctation throughout. First gastral tergite usually finely sculptured. Genitalia large to massive, partially retractile and bizzarely modified in some species. (Males examined: *afrum*, *albopilosum*, *bicolor*, *delagoense*, *effractor*, *excelsior*, *indicum*, *junodi*, *medinae*, *minor*, *pharaonis*, *rufulum*, *santschii*, *subopacum*, *ocellatum*, *viator*.)

One of the largest species-groups of *Monomorium*, the *salomonis*-group is fairly uniform and contains 48 currently recognized species in the Afrotropical region. Many more species are distributed throughout the width of Africa north of the Sahara, the Middle East and the eastern Palaerctic and Oriental regions. A few species occur north of the Mediterranean or on islands in that sea, and several species are accomplished tramps, being transported widely by commercial activity. The definition given above covers the entire group, not just the Afrotropical fauna.

Unlike most other groups within *Monomorium*, *salomonis*-group members are usually distinguished by their conspicuous fine sculpture and marked tendency to reduce the pilosity of the dorsal head and body. Forms with much-reduced sculpture are relatively rare in the group but these species, which may come superficially to resemble members of the *monomorium*-group, usually also exhibit a marked lack of dorsal pilosity on the head and body. In smooth species of the *monomorium*-group dorsal pilosity is generally strongly developed. In general even species of the *salomonis*-group which have lost most or all sculpture dorsally tend to retain it laterally on the alitrunk and everywhere on the propodeum.

This species-group is based broadly on the old concept of a subgenus *Xeromyrmex*, now synonymized, though with many inclusions and exclusions from the form of the group as envisaged by Emery (1922) and Wheeler (1922). *Xeromyrmex* was extremely feebly defined from its inception, and even as early as 1917 Forel considered the subgenus to be insufficiently defined. The Emery-Wheeler classification of 1922 did nothing to improve the stability of the taxon and their joint inclusion of forms not really belonging here, coupled with the exclusion of others for various reasons, only served to confirm that the subgenus was undefinable except in terms of species not fitting anywhere else, grouped loosely on habitus or variable character states. Both Emery and Wheeler relied to a great extent on the relative lengths of antennal club segments to differentiate their subgenera. Arnold (1944) carried out some careful measurements and demolished the assumed usefulness of this character. Incidentally he also demolished a large part of the subgeneric structure of *Monomorium*, but proposed no new system to take it place. It was left to Ettershank (1966) formally to abandon the useless subgenera, clearing the way for the delineation of more meaningful associations of species within the genus.

Another source of confusion within this group, this time at species-level, was the strange habit of early workers of describing any new forms of which they were unsure as infraspecific or infrasubspecific variants of *salomonis* itself, even when the form under description bore only superficial resemblance to that species. The habit later spread to *bicolor*, as discussed below. Of the region's 48 currently valid species two were first described as infraspecific forms of *subopacum*, 4 of *bicolor*, and fully 14 as infraspecific forms of *salomonis*.

Members of the *salomonis*-group are characteristically inhabitants of dry ground and well-drained soils, ranging from Mediterranean climate through savannah and semi-desert to hard desert conditions, and frequently nesting in exposed places where the soil receives direct insolation. It has been postulated (Bolton, 1986*b*) that this may in part be responsible for the frequent development of apterous and ergatoid females within the group. In the few species which have been observed *salomonis*-group members are scavengers and predators of small arthropods.

The Afrotropical species are divided into 8 complexes here, mostly for convenience and to point out

obvious resemblances among various members of the mass of species. Extralimital species-complexes are not discussed and for the greater part remain uninvestigated, though all available material has been examined during this study. It is not claimed that the species-complexes mentioned below reflect any particular phylogenetic significance, too little is known of most species to warrent any such assumption; the *salomonis*-group as a whole does, however, appear to constitute a holophyletic group within *Monomorium*.

Afrotropical species-complexes of the *salomonis*-group (based on workers)

Note that distribution and density of standing pilosity is important in the species-level taxonomy of this group. Old or abraded specimens should be treated with circumspection. The complexes are based on the worker caste as relatively few females and males are known.

The *bicolor*-complex contains six species characterized by their distinctive colouring and sharply defined dense sculpture. The head and alitrunk are orange-yellow to red and the gaster dark brown to black, the latter often with steely or bluish reflections. The two colour zones contrast strongly. All surfaces of the head and alitrunk are blanketed by fine and very dense reticulate-punctate sculpture in which the individual punctures are small but very sharply defined. The sculpture is not reduced or effaced anywhere and the cephalic punctures do not have a smeared or run-together appearance. Standing hairs are always present on the first gastral tergite in front of the apical transverse row. Such hairs are usually absent from the dorsal alitrunk but are numerous in *hirsutum* and one pronotal pair may occur in some samples of *rufulum*.

Members of the *bicolor*-complex are closest related to those of the *opacum*-complex, with which they share the same pilosity and form of sculpture. In the *opacum*-complex, however, the body is uniformly brown or black, or dark brown with a darker gaster; the contrasting colours of the *bicolor*-complex are not developed. Ignoring the difference in colour these two complexes could easily be combined, so closely are they related.

Of the six species in the *bicolor*-complex four are of relatively limited distribution. *M. hirsutum* is known only from Ethiopia, *westi* from Kenya, *personatum* and *dictator* from Angola. *M. bicolor* is very widely distributed in the northern, western, central and eastern portions of the Afrotropical region, and also occurs in the southern Palaearctic, where it is replaced in part by a sibling-species, *nitidiventre*, around the eastern end of the Mediterranean. The final species, *rufulum*, is widely distributed in southern Africa and apparently replaces *bicolor* in Angola, Namibia, Botswana and Zimbabwe (where it was recorded as *nitidiventre* by Arnold (1916)). All appear to be species of savannah, arid zones, or forest clearings where there is well-drained soil and direct insolation.

M. bicolor was, prior to this study, one of the overworked 'form-species' previously much used in the *salomonis*-group. Any red and black *Monomorium* of the *salomonis*-group was described and appended to *bicolor*, forming a welter of infraspecific forms which quickly swamped the nomenclature and rendered accurate identification impossible. The full panoply of names formerly attached to *bicolor*, in the Afrotropical region, included the varieties *coerulescens*, *rufibasis*, *uelensis*, *aequatoriale*, *tropicale*; the subspecies (or stirps) *hirsutum*, *dictator*, *dakarense*, *personatum*, *ebangaense*; and the infrasubspecific names *impuriceps*, *bimaculatum* and *bimaculatoides*. Of these names *hirsutum*, *dictator*, *personatum*, and *dakarense* are now regarded as valid species in the *salomonis*-group (the first three in the *bicolor*-complex); *ebangaense* is a valid species but belongs to the *setigerum*-group. The remainder are synonyms of the various *bicolor*-complex species.

Males are known for *bicolor* and *rufulum*, females for these two species and *dictator*; sexual forms otherwise unknown.

The *opacum*-complex. A small complex of 6 species characterized by their uniformly dull brown colour and sharply defined dense reticulate-punctate sculpture which blankets the head and alitrunk. This complex consists of a central core of four species (*junodi*, *micropacum*, *opacum*, *subdentatum*) and two peripheral species included for convenience (*afrum*, *albopilosum*). Of these peripheral species *afrum* appears to be related to *opacum* but is noticeably more specialized, having lost its gastral pilosity and independently acquired its diagnostic modification of sharp posteroventral occipital corners. *M. albopilosum*, though sharing the characters of colour and sculpture with the rest of the complex, is abundantly hairy. The core-species of the complex are closely related to the members of the *bicolor*-complex on one hand (see above), and to the *subopacum*-complex on the other. The latter complex, however, has very reduced cephalic sculpture.

M. afrum is widely distributed through the drier zones of the entire continent, but does not seem to occur in deserts. The remaining species are apparently restricted to the southern and eastern parts of the

Afrotropical region. Males and females are known for *afrum*, *albopilosum*, and *junodi*; sexual forms of the rest remain unknown.

The *subopacum*-complex, which contains 8 Afrotropical species, shows cephalic sculpture which is much more reduced than in either of the complexes so far discussed. Instead of the head being uniformly sharply reticulate-punctate the sculpture here is reduced to reticulate-granular, shagreenate-punctate, or to a fine superficial reticular patterning which appears inlaid in the surface and does not roughen the surface. In general the alitrunk is more strongly sculptured than the head or both areas show distinct sculpture. The alitrunk (Figs 48, 49, 54) does not show the characteristic outline of the *areniphilum*-complex (Fig. 46).

Within the complex blanketing fine cephalic sculpture is shown by *ocellatum* and *subopacum*, whilst *herero* shows the same sculpture in reduced form, appearing roughly reticulate. The retaining species (*delagoense*, *drapenum*, *kitectum*, *ophthalmicum*, *willowmorense*) have cephalic sculpture reduced to fine superficial reticulation or reticular patterning only, as is also seen in the *tchelichofi*-complex; in this latter complex, however, the alitrunk also has very reduced sculpture. All species have one or more pairs of standing hairs present on the first gastral tergite in front of the apical transverse row.

This complex is intermediate in sculptural reduction between the *opacum*-complex, where sculpture is strong, and the *tchelichofi*-complex in which sculpture is very reduced indeed. All members of the *subopacum*-complex are restricted to southern Africa except for *ophthalmicum* from Ethiopia and *subopacum* itself. The latter is very widely distributed but appears originally to have been a circum-Mediterranean species which has subsequently been spread by commercial activity.

Males and females are known for *subopacum* and *delagoense* (described briefly by Forel, 1910*b*); the females of *ocellatum* and *herero* are known but both sexual forms of all the rest await discovery.

The *tchelichofi*-complex. The five species of this complex are characterized by the reduction of cephalic sculpture to a fine superficial reticular patterning which does not roughen the surface but rather appears inlaid into the surface. The alitrunk sculpture is also much reduced and in general the promesonotum is not more strongly sculptured than the head. Hairs are present on the first gastral tergite in front of the apical transverse row.

Known from four South African and one Ethiopian species the members of this complex form an apparently close-knit unit within the *salomonis*-group because of their very reduced sculpture, though whether this constitutes an apomorphy cannot presently be assessed. Superficially all the species seem quite smooth and glossy, but closer examination reveals the presence of extremely fine superficial reticular patterning, which appears inlaid in the cuticle. Loss of this fine patterning would leave the surface entirely featureless.

The *tchelichofi*-complex seems to form the final stage in a sequence of sculptural reduction which begins in the universal dense reticulate-punctation seen in the *opacum*-complex. This sculpture is reduced in the *subopacum*-complex either evenly over the entire body or partially, on the head, leaving the alitrunk dorsum more strongly sculptured than the cephalic dorsum. In *tchelichofi* and its allies the sculpture is reduced all over the head and promesonotum, so that the latter is no more strongly sculptured than the former. The only sexual form known in this complex is the male of *excelsior*.

The *areniphilum*-complex. The single Afrotropical species currently occupying this complex, *areniphilum*, is recognized by its cephalic sculpture, which is finely reticulate to reticulate-shagreenate but usually overlaid by very fine dense scratch-like longitudinal striation, by its large eyes, and by its characteristically shaped alitrunk outline (Fig. 46). The antennal scapes in *areniphilum* are of moderate length (SI 98–104) and the first gastral tergite has at most a single pair of standing hairs in front of the apical transverse row.

M. areniphilum is circum-Saharan in distribution and several related forms occur in North Africa. The taxonomy of the North African and Middle Eastern forms related to *areniphilum* is very confused and much in need of study.

The *viator*-complex. A complex of four Namib Desert species which are isolated within the *salomonis*-group by a combination of characters including reduced cephalic sculpture, which is superficially reticulate to reticulate-granular; never with sharply defined reticulate-punctate sculpture. The eyes are moderate to very large (0.26–0.40 × HW), and the scapes are long to very long (SI 111–130). Standing hairs are always numerous and fairly evenly distributed on the first gastral tergite in front of the apical transverse row.

Cephalic sculpture in this complex covers the same range of variation as is seen in the *subopacum*-complex, but the scapes there are shorter and the outline shape of the head tends to be different. In *viator* and allies the head in full-face view has the sides in front of the eyes approximately parallel to weakly divergent anteriorly, and the sides behind the eyes convergent posteriorly (Figs 52, 53). In the *subopacum*-complex the sides tend to be evenly shallowly convex, broadest across the midlength and converging both in front of and behind the eyes. Two of the species noted by Marsh (1984) in his pitfall survey of Namib Desert ants are included here. Marsh's *Monomorium* sp. A = *viator*, and his sp. B = *vatranum*. The other two species included in the complex are *mantazenum* and *marshi*, also discovered in the Namib by Marsh.

The male of *viator* is known, all other sexuals are unknown for the members of this complex.

The *mediocre*-complex. A convenience complex to hold five southern African and one Kenyan species which lack pilosity on the alitrunk and on the first gastral tergite in front of the apical transverse row, and which may even lack the apical row itself. All show very reduced sculpture everywhere. In all species cephalic sculpture is represented by faint to vestigial superficial reticular patterning, similar to but fainter than that seen in the much larger species of the *tchelichofi*-complex.

The four small species *esharre*, *osiridis*, *rabirium*, and *zulu* have eyes which are in front of the midlength of the sides of the head, a condition very rare in the *salomonis*-group as defined here but characteristic of the *setuliferum*-group. In *esharre* the eyes remain close to the midlength, but in the other three the forward shift is obvious. It seems most probable that these species have acquired this character independently of the *setuliferum*-group as otherwise they do not conform to the diagnosis of that group. However, as the *setuliferum*-group itself is essentially a catch-all group, holding complexes of species which do not easily fit elsewhere, judgement on the correct placement of *esharre* and its allies must be deferred, pending further investigation.

In situ count of the palp formula shows that *osiridis* and *rabirium* have a reduced PF 1,2, rather than the PF 2,2 usual in the *salomonis*-group. Whether this applies to all species currently placed in the *mediocre*-complex remains to be seen as shortage of material and lack of suitably exposed mouthparts in the few specimens available precludes further investigation.

Because of their reduced sculpture and forward shifted eyes *osiridis*, *zulu* and *rabirium* may be suspected of being specialized *monomorium*-group members which have acquired sculpture, rather than *salomonis*-group members which have shifted eyes and reduced sculpture. I regard the three as specialized members of the *salomonis*-group, not only because they retain vestiges of the characteristic *salomonis*-group sculpture but also because they have grossly reduced pilosity, a trait not seen in the *monomorium*-group, and because they grade back into the mass of the *salomonis*-group, through the more normal members of this complex, namely *esharre*, *mediocre* and *nirvanum*. Sexual forms of all *mediocre*-complex members remain unknown.

The *australe*-complex. A complex of 12 small to minute species (HW 0·42–0·57) in the *salomonis*-group in which the head is opaque, shagreenate-granular to punctulate-shagreenate, and frequently with the mid-dorsal strip of the head showing extremely fine longitudinal scratch-like striolae. The sculpture of the whole head usually has a smeared or silky appearance under low magnification as it is so fine. This form of cephalic sculpture is strongest developed in *carbo*, *darkarense*, *minor*, *damarense*, *parvinode*, *opacior* and *sutu*, tending to be somewhat fainter in *disertum*, and reduced in *australe*, *anceps* and *termitarium*. The first gastral tergite retains hairs in front of the apical transverse row (except in some samples of *damarense*), which may be evenly dispersed on the sclerite or restricted to 2–3 pairs on the basal half. The dorsal alitrunk lacks standing hairs in all species. Eyes are of moderate size (0·24–0·31 × HW except in *sutu* where they are large (0·35–0·38 × HW), and frequently are slightly in front of the midlength of the sides.

Of the 12 included species 7 occur only in the countries of southern Africa. Two, *carbo* and *parvinode*, are only known from Ethiopia and Sudan, one (*sutu*) is Kenyan, and *dakarense* is known from a single sample from Senegal.

Also included in this complex is *senegalense*, a nomen dubium. No type-material of this enigmatic form appears to have survived, but from Roger's (1862) brief description the species seems to fall here. It is just possible that *senegalense* may be a senior synonym of *dakarense*. Male and female are known for *minor*, females also for *damarense* and *opacior*; all other sexuals remain unknown.

The *pharaonis*-complex. A small complex containing the very common cosmopolitan tramp-species *pharaonis* and its two close Indian relatives *longi* Forel and *wroughtoni* Forel. In these the cephalic dorsum and the alitrunk everywhere is blanketed by fine and very dense reticulate-punctulate sculpture. The eyes are slightly in front of the midlength of the sides of the head and are relatively small (0.18–0.21 × HW). Antennal scapes are of moderate length, SI 105 or more. The metanotal groove is distinctly impressed. A pair of standing hairs is present on the pronotal humeri and usually a single pair also occurs on the mesonotum. The first gastral tergite has standing hairs more or less evenly distributed over the sclerite in front of the apical transverse row. Colour varies from uniform yellow to dark brown.

In the Afrotropical region only the *bicolor*-complex and the *opacum*-complex show uniform reticulate-punctate sculpture on the cephalic dorsum similar to that seen in *pharaonis*. *M. pharaonis* separates from all species of these two complexes by being smaller (HW 0·40–0·48 as opposed to a combined HW range of 0·52–0·80 for all species of the *bicolor*- and *opacum*-complexes), by being uniformly yellow in colour, and by having a single pair of stout standing hairs at the pronotal humeri and another single pair on the mesonotum. This combination of characters is not seen in any Afrotropical member of either the *bicolor*-complex or the *opacum*-complex.

As *pharaonis*, commonly called Pharaoh's Ant, is now distributed world wide in the tropics, and is very

widely spread in the subtropical and temperate zones in association with human habitations, the region of origin of the species has led to considerable differences of opinion. Arnold (1916) postulated South America as the original home of *pharaonis*, but as no close relatives exist there, and as there are very few endemic species of *Monomorium* in the New World (Kempf, 1972), and those which do occur all belong to the *monomorium*-group (DuBois, 1986), Arnold's postulate is improbable and is rejected.

The Afrotropical region, which has many species of the *salomonis*-group, was thought by Bernard (1952) to be the place of origin of *pharaonis*. However, his opinion of which species constitute close relatives of *pharaonis* is not accepted here (he included as close relatives *ilgii*, *osiridis*, *hannonis*, *setuliferum* and *termitarium*). As no genuine close relatives of *pharaonis* occur in Africa it is reasonably certain that it is also an introduction in the region.

The most reasonable suggestion, and the one followed here, is that of Emery (1922), who considered India to be the most probable place of origin; a view repeated by Wilson & Taylor (1967). Having examined most extant *Monomorium* species during the course of this study, I conclude that the closest presently detectable living relatives of *pharaonis* are *longi* and *wroughtoni*, both of which are restricted to India, and the joint characters of these three form the diagnosis given above. Accepting that the three are close relatives and noting that the Indian subcontinent is the only place where all three are found together, it seems a reasonable hypothesis that all originated there. It does not of course account for the fact that *pharaonis* has gone on to become perhaps the most successful tramp-species in the world whilst the other two are still restricted to India. Sexual forms of *pharaonis* are known.

Monomorium afrum André

(Fig. 45)

Monomorium afrum André, 1884: 540. Syntype workers, SUDAN: Atbara (*Magretti*) (MNHN) [examined].
Monomorium afrum var. *asmarensis* Forel, 1910*d*: 250. Syntype workers, male, ETHIOPIA: Asmara, Ghinda, Nefassit, iii.1906 (*K. Escherich*) (MHN; MCZ) [examined]. **Syn. n.**
Monomorium afrum var. *fultor* Forel, 1913*a*: 332. Syntype workers, ZAIRE: Shaba, Sankisia, 6.viii.1911 (*Bequaert*) (MHN; MRAC) [examined]. **Syn. n.**

WORKER. TL 3·6–4·3, HL 0·84–1·00, HW 0·66–0·80, CI 78–82, SL 0·72–0·85, SI 103–108, PW 0·46–0·52, AL 1·04–1·26 (35 measured).

Median portion of clypeus with its anterior free margin indented medially, the extent of the indentation varying in different populations from a narrow deep notch to a broad and quite deep concavity. Maximum diameter of eye 0·24–0·27 × HW, and with 10–12 ommatidia in the longest row. With head in profile the posteroventral angles bluntly right-angled or acute and narrowly rounded; not evenly broadly convex (Fig. 45). Viewed from above and behind the posteroventral occipital angles are prominent and acute. Metanotal groove narrowly impressed. Dorsum of propodeum longitudinally impressed, the lateral margins of the impression diverging from front to back and frequently represented by a pair of sharp carinae, though in others the margins are merely bluntly rounded. Node of petiole in dorsal view with its posterior face shallowly transversely concave; degree of concavity varying between samples. Head, alitrunk, petiole and postpetiole sharply and densely reticulate-punctate everywhere. First gastral tergite finely shagreenate, the sculpture sometimes fading apically on the sclerite. Head without standing hairs on dorsal surface behind level of frontal lobes or at most with a single pair mid-dorsally. Alitrunk without standing hairs; petiole with one pair, postpetiole with 1–2 pairs of backward directed hairs. First gastral tergite hairless except for the apical transverse row; these are usually appressed and may even be absent. Colour uniform medium to dark brown, sometimes the gaster darker than the head and alitrunk.

A widely distributed and very conspicuous species, *afrum* is easily identified within the *salomonis*-group by the combination of characters noted above. The shape of the posteroventral occipital angles is unique in the group and immediately isolates *afrum*.

Within the informal aggregation of species termed the *opacum*-complex *afrum* also separates from two other members by its lack of pilosity on the alitrunk, which is present in *junodi* and *albopilosum*. Arnold (1916) records that *afrum* forms populous nests in the soil, generally in exposed or sunny situations. Wheeler (1922) notes that the ants appeared in large numbers at the carcase of a bird. Whether scavenging represents the main feeding method of *afrum* or whether they are opportunists, both scavenging and indulging in active predation when possible, is not known.

The female of *afrum* shows some modifications characteristic of the socially parasitic species *santschii* and *effractor*, and may itself found new colonies by a temporary socially parasitic process.

MATERIAL EXAMINED

Ethiopia: Neffasit (*K. Escherich*); Ghinda (*K. Escherich*); Tessenei (*Remedelli*); Barentu (*Müller*). **Sudan**: Atbara (*Magretti*); Equatoria, Torit (*N. A. Weber*). **Kenya**: Kora (*C. West*); Kora (*Collins & Ritchie*). **Rwanda**: Kakitumba (*Ross & Leech*). **Tanzania**: Kigoma, Mahale Mts (*S. Uehara*); Tanga, Mwembeni (*M. J. Way*). **Central African Republic**: Haut Mbomu (*N. A. Weber*). **Zaire**: Shaba, Sankisia (*Bequaert*); Niapu (*H. O. Lang*); Garamba. **Zimbabwe**: Bulawayo (*G. Arnold*). **Ivory Coast**: Bouaké (*E. Diemé*); Ferké. **Ghana**: Upper Region, Tumu (*P. Room*); Navrongo (*P. Room*); Bolgatanga (*P. Room*); Dawhenya (*C. A. Collingwood*); Amfeda (*C. A. Collingwood*).

Monomorium albopilosum Emery

(Figs 38, 44)

Monomorium albopilosum Emery, 1895*b*: 24. Syntype workers, SOUTH AFRICA: Bloemfontein, Kimberley, Makapan (*E. Simon*); Leribe (*Weitzecker*) (MCSN) [Kimberley syntypes examined].

Monomorium albopilosum var. *thales* Forel, 1913*b*: 136. Syntype workers, ZIMBABWE: Springvale, 5.x.1912 (*G. Arnold*) (BMNH; MHN) [examined]. **Syn. n.**

Monomorium (Xeromyrmex) albopilosum st. *paucipilosa* Santschi, 1919*b*: 235. Syntype workers, SOUTH AFRICA: Natal, 1.v.1898 (*Haviland*) (NMB) [examined]. **Syn. n.**

Monomorium (Xeromyrmex) albopilosum var. *clarithorax* Santschi, 1919*b*: 235. Syntype workers, SOUTH AFRICA: Natal (*Haviland*) (BMNH; NMB) [examined]. **Syn. n.**

Monomorium albopilosum subsp. *fingo* Arnold, 1946: 61, fig. 13. Syntype workers, SOUTH AFRICA: Cape Prov., Albany Dist., Maastricht (*J. W. Geyer*) (BMNH) [examined]. **Syn. n.**

WORKER. TL 3·4–4·4, HL 0·80–1·02, HW 0·58–0·78, CI 73–78, SL 0·68–0·90, SI 110–120, PW 0·42–0·52, AL 1·00–1·32 (30 measured).

Median portion of anterior clypeal margin concave. Head relatively long and narrow, scapes long (CI and SI, above). Eyes of moderate size, the maximum diameter 0·22–0·25 × HW and with 10–12 ommatidia in the longest row. Petiole node high and conical in profile; in dorsal view the two nodes usually of about equal width but sometimes the petiole slightly broader. Sculpture usually of fine dense and sharply defined reticulate-punctation all over the head and alitrunk, but sometimes it is reduced on the head posteriorly, or on the pronotum, or both. Petiole and postpetiole weakly reticulate-punctate to virtually smooth. Gaster shining but first tergite at least with superficial shagreening. Entire body abundantly hairy; all dorsal surfaces of head and body with dense standing pilosity and sides of head in full-face view with freely projecting hairs both in front of and behind the eyes. Pubescence and pilosity of scapes and tibiae elevated, not appressed. Colour uniform light to dark brown, sometimes the gaster slightly darker than the head and alitrunk.

One of only two very densely hairy species within the *salomonis*-group as it is represented in sub-Saharan Africa, the abundant pilosity of *albopilosum* will isolate this species from all others in the group except *hirsutum*. This latter species, however, shows the strongly contrasting colours of the *bicolor*-complex and has a broader head and shorter scapes than in *albopilosum*; compare the *hirsutum* CI of 81–83 and SI of 99–103 with the measurements given above.

Within the *opacum*-complex only *junodi* and *albopilosum* have hairs present on the dorsal alitrunk, but in *junodi* these are sparse and do not occur on the propodeum, whereas in *albopilosum* dense pilosity is present everywhere.

Arnold (1916) characterizes *albopilosum* as a pugnacious species which stings freely. He adds that the nest is in the ground and surrounded by a large low mound of earth. Both alate and apterous females of *albopilosum* are known.

MATERIAL EXAMINED

Malawi: Mlanje (*S. A. Neave*). **Mozambique**: Beira (*G. Arnold*). **Zimbabwe**: Bulawayo (*G. Arnold*); Springvale (*G. Arnold*); Matopo Hills (*G. Arnold*). **South Africa**: Bloemfontein, Kimberley, Makapan (*E. Simon*); Nelspruit (*M. Samways*); Pretoria (*J. C. Faure*); Pretoria (*C. P. Lounsbury*); Natal (*Haviland*); Zululand (*R. H. Harris*); Mfongosi (*W. E. Jones*); Cape Prov., Maastricht (*J. W. Geyer*); Grahamstown (*F. Jacot-Guillarmod*); Grahamstown (*Weatherill & Brown*).

Monomorium anceps Emery **stat. n.**

Monomorium subopacum var. *anceps* Emery, 1895*b*: 24. Syntype workers, South Africa: Transvaal, Hamann's Kraal (*E. Simon*) (MCSN) [examined].

For discussion of this species see under *australe*.

Monomorium areniphilum Santschi

(Figs 46, 51)

Monomorium salomonis var. *areniphila* Santschi, 1911: 84. Syntype workers, Tunisia: Gabes, 1906 (*A. Weiss*); Kebili, 1907; Kairouan (*Santschi*) (NMB) [examined].
Monomorium (Xeromyrmex) salomonis var. *pullula* Santschi, 1919*b*: 235. Syntype workers, Senegal (*Claveau*) (NMB) [examined]. **Syn. n.** (provisional).
Monomorium (Xeromyrmex) salomonis var. *lepineyi* Santschi, 1934: 34, figs 5, 6. Syntype workers, Sudan: Nema (*de Lepiney*) (NMB) [examined]. **Syn. n.** (provisional).
Monomorium areniphilum Santschi; Collingwood, 1985: 269. [Raised to species.]

Worker. TL 3·1–4·3, HL 0·86–1·04, HW 0·67–0·88, CI 78–88, SL 0·68–0·88, SI 98–104, PW 0·40–0·53, AL 0·95–1·24 (30 measured).

Anterior margin of median portion of clypeus evenly shallowly concave. Eyes large, the maximum diameter 0·30–0·35 × HW and with 12–14 ommatidia in the longest row. Sides of head evenly shallowly convex in full-face view, the occipital margin approximately transverse to broadly but shallowly concave. Pronotum and anterior portion of mesonotum in profile evenly convex; median portion of mesonotum flat to shallowly convex, sometimes even slightly indented; posterior one-third (approximately) of mesonotum suddenly sloping much more steeply to the conspicuously impressed metanotal groove. Highest point of propodeal dorsum behind the metanotal groove on a much lower level than the highest point of the promesonotum. In dorsal view the propodeum with a narrow flattened median longitudinal strip, the dorsum and sides separated by bluntly rounded margins. Dorsum of head with 1–2 pairs of standing hairs, which straddle the midline; occipital corners without hairs. Dorsal alitrunk without standing hairs. Petiole node with one pair, postpetiole with 2–3 pairs (very rarely with 4 pairs) of backward directed hairs. First gastral tergite without standing hairs except for the apical transverse row, or at most with a single pair at or near the midlength of the sclerite. Dorsum of head with fine dense reticulate to reticulate-shagreenate sculpture; this often extensively overlaid, especially mid-dorsally, by exceptionally fine dense scratch-like longitudinal sculpture. Dorsal alitrunk reticulate to shallowly reticulate-punctate, the propodeum more strongly sculptured than the pronotum; intensity of sculpture variable between series. First gastral tergite at least with superficial reticular patterning, more often this is overlaid by a secondary fine shagreening. Colour brown, very variable in shade.

I am grouping the names *areniphilum*, *lepineyi* and *pullulum* as a single species here, based on the following combination of five characters within the *salomonis*-group.

Eyes both relatively and absolutely large (see measurements above).

Antennal scapes of moderate length (SI 98–104).

Characteristic outline shape of dorsal alitrunk (Fig. 46).

Cephalic sculpture (as described above).

Very reduced dorsal pilosity (as described above).

M. areniphilum appears to be a successful circum-Saharan species which shows variation in colour and size over its wide range but which seems consistent in the characters noted above. It is accepted that the name as now applied may conceal two or more close but discrete sibling species, but only a detailed investigation of the North African fauna, with its welter of unresolved infraspecific names attached to *salomonis* and its relatives, will be able to resolve the confusion. I am unable to undertake such a study here, so for the present I regard *lepineyi* and *pullulum* provisionally as junior synonyms of *areniphilum*, fully realizing that this situation may change once detailed taxonomic investigation is possible.

The single *lepineyi* syntype available for study matches *areniphilum* moderately well, but is smaller and darker in colour, being a uniform blackish brown, and has the head narrower than the *areniphilum* syntypes. The eyes in the *lepineyi* syntype are slightly larger than in *areniphilum* and the sides of the head are not as distinctly convergent posteriorly.

The syntypes of *pullulum* are relatively large specimens but their indices are within the *areniphilum* range. These syntypes are uniformly dark brown on the head and alitrunk but have a blackish brown gaster. The cephalic sculpture in *pullulum*, whilst of the same form as in *areniphilum*, tends to be denser.

Essential measurements and indices of the syntypes of the three names now provisionally regarded as synonymous are as follows.

	HW	CI	SL	SI	Size of eye	number
pullulum	0·86–0·88	83–85	0·86–0·88	99–102	0·30 × HW	3
areniphilum	0·76–0·81	84–88	0·76–0·81	99–100	0·30 × HW	3
lepineyi	0·67	78	0·68	101	0·33 × HW	1

MATERIAL EXAMINED

Egypt: Siwa (*J. Omer-Cooper*). **Sudan**: Nema (*de Lepiney*); Khartoum (*R. Cottam*); Khartoum (*J. Cloudsley-Thompson*). **Tunisia**: Gabes (*A. Weiss*); Kebili (*Santschi*). **Algeria**: Adrar (*P. Room*); Bordj Moctar (*P. Room*); Ahaggar, Tamsuejat (*Meinertzhagen*). **Mali**: Gao (*B. Malkin*); Gao (*P. Room*); Bourem (*P. Room*); Tessalit (*P. Room*); Anefis (*P. Room*); Labezanga (*P. Room*). **Niger**: Ayorou (*P. Room*); Assango (*J. Newby*). **Senegal**: no loc. (*Claveau*).

Monomorium australe Emery

Monomorium subopacum r. *australe* Emery, 1886: 363. Syntype workers, SOUTH AFRICA: Cape of Good Hope (*L. Peringuey*) (MCSN; MRAC) [examined].

Monomorium subopacum r. *australe* var. *laeviceps* Emery, 1886: 364. Syntype workers, SOUTH AFRICA: Cape of Good Hope (*L. Peringuey*) (MCSN). [Unavailable name.]

Monomorium (Paraholcomyrmex) [sic] *australe* Emery; Santschi, 1917: 282. [Raised to species but misidentified and placed in wrong subgenus.]

As the three names *australe*, *anceps* and *termitarium* constitute a very close triad which may represent only one real species, the usual format of the revision is abandoned here so that the three may be considered together.

These three southern African forms are retained for the present as separate species until more material is collected for study, at which time it may be possible to show whether they are indeed separate or whether two or all of them are synonymous. All three are represented only by short syntypic series at the time of writing. The three together are characterized by the following shared characters within the *salomonis*-group.

Relatively small forms, their combined dimensions being TL 2·4–2·6, HL 0·60–0·66, HW 0·46–0·52, CI 75–79, SL 0·47–0·54, SI 100–104, PW 0·30–0·35, AL 0·68–0·76. Maximum diameter of eye 0·24–0·26 × HW and with 7–9 ommatidia in the longest row. [Note that this combined range of dimensions is no greater than those frequently encountered in what are indubitably single species elsewhere in this species-group.] Head with feebly developed shagreenate-granular sculpture so that the cephalic dorsum appears weakly shining and semi-smooth. Dorsal alitrunk lacking standing hairs of any description. Petiole with a single pair of backward directed hairs, postpetiole with 1–2 pairs of hairs. First gastral tergite with 2–3 pairs of hairs in front of the apical transverse row, the hairs confined to the basal half of the sclerite.

Within the limits of this diagnosis the dimensions of the three are as follows.

M. termitarium syntypes, TL 2·5–2·6, HL 0·60–0·64, HW 0·46–0·51, CI 75–79, SL 0·48–0·53, SI 100–104, PW 0·30–0·35, AL 0·70–0·76; maximum diameter of eye 0·24–0·25 × HW, with 7–8 ommatidia in the longest row (6 measured).

M. australe syntypes, TL 2·5–2·6, HL 0·64–0·66, HW 0·50–0·52, CI 78–79, SL 0·50–0·54, SI 100–104, PW 0·32–0·34, AL 0·74–0·76; maximum diameter of eye 0·25–0·26 × HW, with 9 ommatidia in the longest row (4 measured).

M. anceps syntypes, TL 2·4, HL 0·60, HW 0·47, CI 78, SL 0·47, SI 100, PW 0·30, AL 0·68; maximum diameter of eye 0·26 × HW, with 7–8 ommatidia in the longest row (2 measured).

Characters which presently serve to isolate the three syntypic series include colour, sculpture and gastral pilosity, but all are weak and may prove to be gradient. For the present the differentiation is as follows.

M. termitarium is a uniformly yellow species from Botswana in which the mesonotal dorsum is superficially reticulate-punctate. The pronotal dorsum is similarly sculptured but the sculpture is more reduced and somewhat effaced so that the punctures are vestigial. In other words the pronotal dorsal sculpture is obviously a reduced and effaced version of that seen on the mesonotum. Two pairs of hairs are present on the basal half of the first gastral tergite.

M. australe, from Cape Province, South Africa, is a medium brown species with a darker brown gaster. Dorsal alitrunk sculpture corresponds with the above, being reticulate-punctate on the mesonotum and feebly reticulate on the pronotum, again the pronotal sculpture obviously a reduced and effaced version of

the mesonotal. The syntypes show varying degrees of abrasion but it appears that two pairs of hairs occur on the basal half of the first gastral tergite.

M. anceps, from Transvaal, South Africa, is medium brown with a darker brown gaster. The mesonotal dorsum is sharply reticulate-punctate whilst the pronotal dorsum is finely shagreenate. In other words the two areas show distinctly contrasting sculpture and the pronotal component does not appear to be merely a reduced and effaced version of that seen on the mesonotum. Three pairs of hairs occur on the basal half of the first gastral tergite.

Apart from their original descriptions, subsequent inclusion in Arnold (1916), and their later appearances in catalogues and lists, no further comments on the taxonomy of *anceps* or *termitarium* occur anywhere in the literature.

Arnold (1916: 224–225) reproduced a translation of the original description of *anceps* and *termitarium*, and presented a redescription of *australe* which is certainly based on misidentified material as his specimens were much larger (TL 3·3–3·8) than the syntypes. Mysteriously he gave *australe* in his key (p. 205) as having a fairly well-defined median ocellus present, but does not mention this in the description. It is most probable that Arnold did not see the *australe* syntypes, where ocelli are absent, and that this material refers to the specimens later described as *ocellatum*.

Santschi (1917) redescribed *australe* and elevated it to the status of a valid species, but transferred it to the *destructor*-group (= subgenus *Parholcomyrmex*). From his notes and description it is obvious that he thought the *australe* syntypes to be part of a polymorphic species, and considering his description it seems most likely that the major workers which he described (provided by Arnold and perhaps also specimens referred to *australe* by Arnold, 1916) are *havilandi*; certainly they are not conspecific with the *australe* syntypes. In the same paper Santschi gives *havilandi* as a stirps of *australe*. The type-material of *havilandi* is radically different from that of *australe*, belonging to another species-group, but does bear some resemblance to members of the *destructor*-group, which reinforces the conclusion that Santschi's (1917: 282–284) interpretation of *australe* is a misidentification.

In summary, *australe* and its close relatives *anceps* and *termitarium*, are members of the *salomonis*-group and may represent only a single species, but more material is necessary before any sound conclusions can be drawn.

MATERIAL EXAMINED

South Africa: Transvaal, Hamann's Kraal (*E. Simon*); Cape of Good Hope (*L. Peringuey*). **Botswana**: Kalahari, Kooa (*L. Schultze*).

Monomorium bicolor Emery

Monomorium bicolor Emery, 1877: 368. Syntype workers, ETHIOPIA: Sciotel, Bogos, 1870 (*O. Beccari*) (MCSN; MRAC) [examined].

Monomorium bicolor var. *coerulescens* Santschi, 1912: 148. Holotype worker, DJIBOUTI: Obock, 1893 (*M. Maindron*) (MNHN) [examined]. [Synonymy by Santschi, 1914*c*: 353.]

Monomorium bicolor var. *rufibasis* Santschi, 1914*c*: 353. Syntype workers, EGYPT: Upper Egypt (diagnosis in key) (not in NMB, presumed lost). **Syn. n.**

[*Monomorium bicolor* var. *rufobasalis* Santschi; Santschi, 1926*a*: 240. Misspelling of *bicolor* var. *rufibasis* Santschi, 1914*c*: 353.]

Monomorium (Xeromyrmex) bicolor var. *uelense* Santschi, 1926*a*: 239. Syntype workers, ZAIRE: Haut Uelé, Moto, 1920 (*L. Burgeon*) (NMB; MRAC) [examined]. **Syn. n.**

[*Monomorium (Xeromyrmex) bicolor* var. *uluense* Santschi; Santschi, 1926*a*: 240. Misspelling of *bicolor* var. *uelense* Santschi, 1926*a*: 239. The spelling *uluense* occurs on the syntype data labels but *uelense* is the original orthography.]

Monomorium (Xeromyrmex) bicolor var. *aequatoriale* Santschi, 1926*a*: 240. Syntype workers, CAMEROUN: Gr. Batanga, 1911 (*Schwab*), (*Wasmann*) (NMB) [examined]. **Syn. n.**

Monomorium (Xeromyrmex) bicolor var. *tropicale* Santschi, 1926*a*: 240. Syntype workers, female, ZAIRE: Stanleyville (*Majella*) (NMB) [examined]. **Syn. n.**

WORKER. TL 3·2–3·9, HL 0·70–0·93, HW 0·52–0·75, CI 73–83, SL 0·56–0·78, SI 104–115, PW 0·36–0·50, AL 0·82–1·20 (25 measured).

Third and fourth (basal) tooth of mandible approximately the same size or the fourth very slightly smaller than the third, but the basal tooth never reduced to a minute denticle. Median portion of clypeus with its anterior free margin usually indented, more rarely the margin approximately transverse but never with flanking sharp teeth. Eyes of moderate size, the maximum diameter 0·24–0·27 × HW. Ventral surface

of head with curved simple hairs but lacking extremely long J-shaped ammochaete hairs. Dorsal alitrunk hairless, petiole with one pair and postpetiole with 1–2 pairs of posteriorly directed hairs. Discounting the apical transverse row the first gastral tergite usually with only 1–2 pairs of hairs, situated on the basal half; rarely 3–4 pairs of hairs present. Dorsum and sides of head and entirety of alitrunk densely and sharply reticulate-punctate. Gaster usually finely and densely shagreenate dorsally but the sculpture may fade posteriorly in some examples and is reduced in a few. Colour bright orange to red on the head and alitrunk, the gaster blackish brown to black, the two strongly contrasting. First gastral tergite frequently with an anteromedian paler area.

The most successful and widely distributed species of its group in the Afrotropical region, *bicolor* also extends it range into the drier zones of southern Palaearctic, being found in North Africa and Saudi Arabia. In sub-Saharan Africa *bicolor* is characteristically a species of open savannah or semi-arid zones, but it also occurs in forested areas where there is some direct insolation, often being found on forest paths in Nigeria and Ghana. Nests are constructed directly into the earth and the species appears to be a general scavenger in habits, quickly appearing in traps baited with crushed large insects.

In the *bicolor*-complex *bicolor* is characterized by the features listed above, differing from its closest relatives in that it lacks the densely hairy alitrunk seen in *hirsutum*, has much smaller eyes than *personatum* (0·31–0·33 × HW), lacks the reduced basal mandibular tooth of *rufulum*, lacks the pair of sharp clypeal teeth characteristic of *westi*, and lacks the dense gastral pilosity of *dictator*.

MATERIAL EXAMINED

Ethiopia: Gamo, Konso (*H. Scott*); Sciotel, Bogos (*O. Beccari*); Eritrea, Ailet (*Müller*). **Sudan**: Khartoum (*R. Cottam*); Shamba (*J. E. Mellor*); Kadugli (*C. Sweeny*). **Djibouti**: Obeck (*M. Maindron*). **Kenya**: Kora (*C. West*); Kora (*Collins & Ritchie*). **Liberia**: Monrovia. **Burkina Faso**: Ougadougou (*P. Room*). **Ghana**: Mole Game Res. (*J. C. Grieg*); Mampong (*P. Room*); Bolgatanga (*P. Room*); Tumu (*P. Room*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*); nr Lake Chad (*J. C. Deeming*); Bakura (*E. A. Mill*); Sokoto (*E. A. Mill*); Mokwa (*C. Longhurst*). **Togo**: Tové (*B. Dufour*). **Cameroun**: Gr. Batanga (*Schwab*); Metet (*Schwab*); Nkoemvon (*D. Jackson*). **Zaire**: Haut Uelé, Moto (*L. Burgeon*), Kisangani (*Majella*); Kisangani (*N. A. Weber*); Ituri For., Beni Irumu (*N. A. Weber*).

Monomorium carbo Forel **stat. n.**

Monomorium salomonis var. *carbo* Forel, 1910*d*: 251. Syntype workers, ETHIOPIA: Ghinda (*K. Escherich*) (MHN) [examined].

WORKER. TL 2·3–2·4, HL 0·60–0·63, HW 0·43–0·45, CI 71–72, SL 0·44–0·48, SI 102–107, PW 0·30–0·31, AL 0·66–0·70 (2 measured).

Anterior margin of median portion of clypeus shallowly concave. With head in full-face view the sides weakly divergent from back to front, the occipital margin shallowly concave. Maximum diameter of eye 0·24–0·26 × HW and with 7 ommatidia in the longest row. The eyes very slightly in front of the midlength of the sides. Metanotal groove scarcely impressed in profile, the propodeal dorsum flattened to weakly depressed medially, without sharp lateral margins. Occipital margin of head with a pair of hairs straddling the midline and another pair closer to the occipital corners. Dorsal alitrunk without hairs. Petiole and postpetiole each with 1–2 pairs of backward directed hairs. First gastral tergite with numerous hairs which are evenly distributed over the surface in front of the apical transverse row. Dorsum of head opaque, shagreenate-punctulate everywhere. Dorsal alitrunk finely reticulate-punctate, the sides similarly sculptured but somewhat effaced on the sides of the pronotum. First gastral tergite shining, with superficial reticular patterning only. Colour uniform dark brown to blackish brown.

This enigmatic Ethiopian species is only known from the type-series of a couple of workers. At first glance it appears to be related to *minor*, a yellow species from Namibia and Angola which itself seems to be intermediate between this complex and the *viator*-complex, but the wide separation of their habitats and the differences in their scape indices stand against this apparent relationship. Fresh material will have to be obtained before a clear picture of what constitutes *carbo* can be developed.

MATERIAL EXAMINED

Ethiopia: Ghinda (*K. Escherich*).

Monomorium dakarense Santschi **stat. n.**

Monomorium bicolor st. *dakarensis* Santschi, 1914*c*: 353. Syntype workers, SENEGAL: Longa (*Roubaud*) (NMB) [examined]. [Diagnosis in key.]

WORKER. TL 2·2–2·3, HL 0·57–0·59, HW 0·44–0·47, CI 77–80, SL 0·44–0·45, SI 95–100, PW 0·30–0·31, AL 0·66–0·70 (3 measured).

Maximum diameter of eye 0·23–0·24 × HW, with 7–8 ommatidia in the longest row. Distribution of pilosity as in *bicolor* but first gastral tergite with numerous standing hairs in front of the apical transverse row. Head under low magnification appearing uniformly finely granular; under higher magnification the entire dorsum opaque, very finely and densely punctulate-shagreenate and having a silky appearance. Alitrunk, petiole and postpetiole finely densely reticulate-punctate. First gastral tergite shagreenate. Head and alitrunk orange-yellow to dull orange-brown, the gaster blackish brown, the two colours strongly contrasting.

Associated with *bicolor* until the present, *dakarense* is best regarded as a distinct species. Apparently it was linked to *bicolor* by Santschi (1914*c*) purely on the grounds of their similar colour, but he separated them by saying that in *dakarense* the scape was shorter and the psammophore better developed. The scape is indeed shorter in *dakarense* (SI 95–100) than in *bicolor* (SI 104–115), but also the former is considerably smaller (compare the measurements above with *bicolor* HL 0·70–0·93, HW 0·52–0·75, SL 0·56–0·78). The cephalic sculpture of *bicolor* is composed of sharply defined reticulate-punctation everywhere, and the first gastral tergite is less densely hairy.

M. dakarense is separated from its immediate allies by combining the distinctive colour scheme of the *bicolor*-complex with a lack of the reticulate-punctate cephalic sculpture usually associated with that colour scheme, replacing it by the silky punctulate-shagreenate sculpture generally associated with *sutu* and its close relatives in the *australe*-complex. It is thus difficult to decide if *dakarense* is a member of the *bicolor*-complex (because of its colour) which has independently acquired the cephalic sculpture typical of *sutu* and allies, or if it is a member of the *australe*-complex which has acquired the *bicolor*-complex colour scheme. For the present I incline towards the latter as *dakarense* seems closer morphologically to *opacior*, *parvinode* and *minor* than it does to any member of the *bicolor*-complex.

MATERIAL EXAMINED

Senegal: Longa (*Roubaud*).

Monomorium damarense Forel **stat. n.**

Monomorium salomonis subsp. *damarense* Forel, 1910*c*: 17. Syntype workers, NAMIBIA: Damaraland, Gawieb (*L. Schultze*) (MHN) [examined].

Monomorium salomonis var. *unicolor* Stitz, 1923: 156. Syntype worker (lacking head), NAMIBIA: Omaruru, 21–22.vi.1911 (*Michaelsen*) (MNHU) [examined]. **Syn. n.**

WORKER. TL 2·2–2·8, HL 0·58–0·68, HW 0·42–0·51, CI 72–75, SL 0·48–0·59, SI 110–116, PW 0·29–0·34, AL 0·66–0·80 (12 measured).

Median portion of clypeus with anterior margin transverse to shallowly concave. Maximum diameter of eye 0·27–0·31 × HW, with 7–9 ommatidia in the longest row. Scapes relatively long (SI > 105), longer than any other species included in the *australe*-complex. Metanotal groove feebly impressed in profile. Dorsum of head without standing hairs behind the level of the frontal lobes. Dorsal alitrunk without standing hairs. Petiole node without hairs but postpetiole with a single backward directed pair. First gastral tergite with minute appressed pubescence but usually without hairs except for the apical transverse row. Dorsum of head opaque, blanketed with very fine and dense reticulate-shagreenate to striolate-punctulate or granulate-punctulate sculpture; close to the occipital margin the sculpture may appear feebly reticulate-punctulate. Pronotal dorsum finely reticulate, the sculpture becoming more intense posteriorly on the dorsal alitrunk so that the propodeum is superficially reticulate-punctulate. First gastral tergite with superficial reticular patterning, which is overlaid by fine shagreening basally. Colour light brown to medium brown.

The extremely reduced dorsal pilosity coupled with the relatively strong cephalic sculpture and long scapes render this Namibian and Botswanan species easily recognisable. Namibian samples uniformly lack hairs on the first gastral tergite in front of the apical row, but a short series from Serowe in Botswana has a single short pair at about the midlength of the sclerite. Whether this series should be regarded as a separate species cannot be decided at present because of shortage of material with which to assess the stability of the character.

MATERIAL EXAMINED

Namibia: Damaraland, Gawieb (*L. Schultze*); Omaruru (*Michaelsen*); Kuiseb Riv., nr Gobabeb (*A. C. Marsh*); Namib Desert, 15° 36′ E, 23° 04′ S (*A. C. Marsh*). **Botswana**: Serowe (*P. Forchhammer*).

Monomorium delagoense Forel

Monomorium salomonis st. *delagoense* Forel, 1894*a*: 87. Syntype workers, MOZAMBIQUE: Delagoa (= Maputo) (*Liengme*) (BMNH; MHN) [examined].
Monomorium salomonis r. *delagoense* var. *grahamstownensis* Forel, 1914: 245. Syntype workers, SOUTH AFRICA: Cape Prov., Grahamstown (MHN) [examined]. [Unavailable name.]
Monomorium delagoense Forel; Santschi, 1928: 192. [Raised to species.]
Monomorium delagoense var. *lacrymans* Arnold, 1944: 15, fig. 19. Syntype workers, SOUTH AFRICA: Natal, Weenen (*H. P. Thomasset*) (BMNH) [examined]. **Syn. n.**

WORKER. TL 3·1–3·9, HL 0·72–0·92, HW 0·58–0·77, CI 80–85, SL 0·56–0·70, SI 88–95, PW 0·40–0·50, AL 0·84–1·08 (20 measured).

Anterior free margin of median portion of clypeus evenly concave. Eyes of moderate size, the maximum diameter 0·22–0·24 × HW and with 9–11 ommatidia in the longest row. Dorsum of head with 3–4 pairs of standing hairs behind the level of the frontal lobes. Dorsal alitrunk with a single pair of long hairs at the pronotal humeri, but otherwise hairless. Petiole node with one pair and postpetiole with 2–3 pairs of backward directed hairs, the first gastral tergite with numerous hairs which are more or less evenly distributed over the entire sclerite. Dorsum of head finely shagreenate to superficially reticulate everywhere, usually with fine longitudinal striolation between and immediately behind the frontal lobes. Alitrunk finely and densely reticulate-punctate everywhere, the promesonotal dorsum distinctly more strongly sculptured than the cephalic dorsum behind the level of the eyes. Petiole and postpetiole finely reticulate-punctate. First gastral tergite usually with fine superficial reticulation only, but sometimes this is absent, leaving the surface featureless. Sometimes the superficial reticulation is denser basally and fades out posteriorly on the sclerite. Colour uniform medium to dark brown, or with the gaster somewhat darker than the head and alitrunk.

The only member of the *subopacum*-complex to possess standing hairs on the dorsal alitrunk, *delagoense* is also the species which links the *opacum*-complex to the *subopacum*-complex. It is very close to *junodi* but is distinguishable by its reduced cephalic sculpture, which is much less strongly developed than on the promesonotum. In *junodi* the head and promesonotum are approximately evenly sculptured, both areas being densely reticulate-punctate. Most populations of *junodi* tend to have more than one pair of hairs on the dorsal alitrunk, although in some only the pair at the pronotal humeri is present. In *delagoense* hairs behind the humeral pair are apparently never developed.

MATERIAL EXAMINED

Mozambique: Maputo (*Liengme*). **South Africa**: Natal, Weenen (*H. P. Thomasset*); Natal (*Haviland*); Pietermaritzburg (*G. Arnold*); Mkuzi Reserve (*C. Peeters*); Cape Prov., Grahamstown (*G. Baines*); Grahamstown (*W. L. Brown*); Grahamstown (*J. Hewitt*); Grahamstown (*Weatherill & Brown*).

Monomorium dictator Santschi **stat. n.**

Monomorium (Xeromyrmex) bicolor st. *dictator* Santschi, 1937: 222, figs 20, 21. Syntype workers, female, ANGOLA: Ebanga, 1932–33 (*A. Monard*) (NMB) [examined].
Monomorium (Xeromyrmex) bicolor st. *personatum* var. *impuriceps* Santschi, 1937: 222. Syntype workers, ANGOLA: Ebanga, 1932–33, no. 117–136 (*A. Monard*) (NMB) [examined]. [Unavailable name.]

WORKER. TL 2·9, HL 0·74–0·76, HW 0·57–0·59, CI 77–78, SL 0·62–0·63, SI 107–109, PW 0·40, AL 0·86 (3 measured).

Third and fourth (basal) tooth of mandible subequal in size, the latter very slightly smaller than the former but not reduced to a minute denticle. Median portion of clypeus with its anterior free margin shallowly concave and flanked by rounded blunt angles, without projecting sharp teeth at the apices of the clypeal carinae. Eyes of moderate size, the maximum diameter about 0·25 × HW and with 9–10 ommatidia in the longest row. Dorsal alitrunk without hairs but the first gastral tergite conspicuously pilose, with 6–8 pairs of evenly distributed hairs on the sclerite in front of the apical transverse row. Entirety of head and alitrunk reticulate-punctate. Head and alitrunk red to orange-red, the gaster blackish brown to black, without an orange or reddish patch mediobasally.

M. dictator is closely related to *bicolor* and *rufulum*. It separates from the former by having the gaster much more densely hairy than in *bicolor*, and *dictator* lacks the very reduced fourth (basal) tooth on the

mandible, which is characteristic of *rufulum*. Other members of the *bicolor*-complex, characterized together by their possession of dense reticulate-punctate sculpture on the head and alitrunk, and bicoloured body with the gaster blackish brown to black and the head and alitrunk reddish, separate from *dictator* as follows.

M. westi, presently known only from Kenya, has the two longitudinal clypeal carinae terminating in freely projecting sharp teeth, not developed in *dictator*. *M. personatum*, a species sympatric with *dictator*, has much larger eyes whose maximum diameter is 0·31–0·33 × HW, as opposed to 0·25 × HW in *dictator*. *M. hirsutum*, known only from Ethiopia, has the dorsal alitrunk densely hairy; in *dictator* the alitrunk lacks standing hairs.

MATERIAL EXAMINED

Angola: Ebanga (*A. Monard*).

Monomorium disertum Forel **stat. n.**

Monomorium salomonis var. *diserta* Forel, 1913*c*: 216. Syntype workers, ZIMBABWE: Shiloh, 10.v.1913, no. 172 (*G. Arnold*) (BMNH; MHN) [examined].

Monomorium (Xeromyrmex) termitarium st. *disertum* var. *petulans* Santschi, 1928: 194. Syntype workers, ZIMBABWE: Sawmills, 11.vii.1920 (*G. Arnold*) (NMB) [examined]. [Unavailable name.]

WORKER. TL 2·0–2·2, HL 0·52–0·60, HW 0·41–0·48, CI 77–81, SL 0·38–0·43, SI 89–93, PW 0·28–0·31, AL 0·58–0·64 (9 measured).

Anterior margin of median portion of clypeus transverse to shallowly concave. Sides of head extremely weakly convex in full-face view, the occipital margin very shallowly concave. Antennal scapes relatively short, SI < 95. Maximum diameter of eye 0·25–0·27 × HW, with 7–9 ommatidia in the longest row. Metanotal groove feebly impressed. Dorsum of head apparently with a single pair of standing hairs behind the level of the frontal lobes, situated just behind the level of the eyes. The available material is abraded and a second pair may be present close to the occipital margin. Dorsal alitrunk without hairs. Petiole node without hairs, the postpetiole with one backward directed pair. First gastral tergite with a single pair of standing hairs in front of the apical transverse row, situated approximately at the midlength of the sclerite. Head very finely shagreenate to reticulate-shagreenate, mid-dorsally usually with extremely fine longitudinal striolate markings. Pronotal dorsum finely shagreenate to reticulate-shagreenate, the sculpture becoming more obviously reticulate to reticulate-punctate on the propodeum. First gastral tergite with superficial reticular patterning only. Colour pale brownish yellow, the gaster sometimes slightly darker than the alitrunk.

A small yellowish species which seems related to *australe* and its immediate allies, *disertum* differs from them by having relatively shorter scapes and lacking backward directed hairs on the petiole node. Apart from this *disertum* appears to have only a single pair of standing hairs on the first gastral tergite in front of the apical transverse row, whereas *australe* and allies have 2–3 pairs.

MATERIAL EXAMINED

Zimbabwe: Shiloh (*G. Arnold*); Sawmills (*G. Arnold*); Birchenough Bridge (*G. Arnold*).

Monomorium drapenum **sp. n.**

(Fig. 48)

HOLOTYPE WORKER. TL 2·4, HL 0·65, HW 0·50, CI 77, SL 0·50, SI 100, PW 0·32, AL 0·68.

Anterior free margin of median portion of clypeus shallowly convex. Eyes relatively large, the maximum diameter 0·28 × HW. Sides of head in full-face view evenly shallowly convex, broadest at the level of the eyes and narrowing slightly both anteriorly and posteriorly; occipital margin broadly but shallowly concave. With the alitrunk in profile the pronotal dorsal outline feebly convex, the mesonotum more or less flat and sloping shallowly to the weakly impressed metanotal groove. Propodeum in dorsal view feebly transversely concave at the curvature where dorsum meets declivity. Petiole and postpetiole of approximately equal width in dorsal view; in profile the petiole node slightly higher than the postpetiole. Anterior peduncle of petiole ventrally with a broad blunt lamelliform process. Dorsum of head behind level of frontal lobes with appressed sparse pubescence and with four pairs of standing hairs, of which three pairs are close to the midline and the fourth is situated on the occipital margin close to the corners. Dorsal alitrunk without standing hairs, with fine sparse appressed pubescence present. Petiole with one pair and

postpetiole with two pairs of backward directed hairs. First gastral tergite with hairs evenly distributed over the surface of the sclerite. Cephalic dorsum polished and shining, sculpture from level of eyes to occipital margin consisting only of an extremely fine superficial reticular patterning. Dorsal alitrunk more strongly sculptured than the head, the sculpture increasing in intensity from front to back. Pronotum superficially reticulate, grading on the mesonotum into raised reticulation and weak reticulate-punctate sculpture posteriorly; propodeal dorsum reticulate-punctate. Sides of pronotum polished and weakly reticulate-shagreenate, the remainder finely reticulate-punctate. Petiole and postpetiole reticulate to weakly reticulate-punctulate. First gastral tergite superficially reticulate, the patterning denser basally than apically. Head and gaster dark brown, alitrunk, petiole and postpetiole medium brown.

PARATYPE WORKERS. TL 2·4–2·6, HL 0·60–0·67, HW 0·46–0·52, CI 73–78, SL 0·46–0·51, SI 98–104, PW 0·32–0·34, AL 0·68–0·72 (18 measured). Maximum diameter of eye 0·28–0·32 × HW, with 8–10 ommatidia in the longest row. As holotype but some samples uniformly dark brown and some individuals with the subpetiolar process more acute than in the holotype, appearing more dentiform than lobate. Postpetiole sometimes with only a single pair of hairs.

Holotype worker, **Namibia**: Namib Desert, 15° 36′ E, 23° 04′ S, sample P 18, pitfall, 1984 (*A. C. Marsh*) (BMNH).

Paratypes. 8 workers with same data as holotype; 6 workers with same data but 15° 13′ E, 23° 06′ S, sample P 15; 3 workers with same data but 15° 36′ E, 23° 04′ S, sample P 14; 3 workers with same data but 15° 36′ E, 23° 04′ S, sample P 22; 3 workers with same data but 15° 18′ E, 23° 06′ S, sample P 23; 3 workers with same data but 15° 24′ E, 23° 06′ S, sample P 24; 3 workers with same data but 15° 24′ E, 23° 06′ S, sample P 25 (BMNH; MHN; MCZ).

Non-paratypic material examined. **Namibia**: Namib Desert, Mirabib, sample 192 (*A. C. Marsh*).

This distinctive small Namib Desert species is quickly identified by its sculpture, distribution of pilosity, and presence of a conspicuous lobate to dentiform subpetiolar process.

Monomorium esharre sp. n.

HOLOTYPE WORKER. TL 1·9, HL 0·52, HW 0·40, CI 77, SL 0·38, SI 95, PW 0·27, AL 0·56.

Median portion of clypeus with anterior margin shallowly convex. Eyes situated slightly in front of midlength of sides; maximum diameter of eye 0·25 × HW and with 7 ommatidia in the longest row. In full-face view the sides of the head weakly convergent behind the eyes and the occipital margin shallowly concave. Promesonotal dorsum evenly feebly convex in profile, the metanotal groove not impressed but the propodeal dorsum on a lower level than that of the mesonotum. Dorsum of head without standing hairs behind the level of the frontal lobes. Dorsal alitrunk without standing hairs. Petiole node without hairs but postpetiole with a single backward directed pair. First gastral tergite with an apical transverse row of hairs but without standing hairs on the tergite in front of this. Cephalic dorsum sculptured with faint superficial reticular patterning only. Pronotal dorsum finely reticulate to reticulate-shagreenate, the mesonotal dorsum similar; propodeal dorsum finely reticulate-punctulate to reticulate-granular. First gastral tergite with superficial reticular patterning only. Head and gaster blackish brown, the alitrunk somewhat lighter brown.

PARATYPE WORKERS. TL 1·9–2·0, HL 0·52–0·54, HW 0·40–0·42, CI 77–78, SL 0·38, SI 90–95, PW 0·26–0·27, AL 0·56 (2 measured). Maximum diameter of eye 0·24–0·25 × HW and with 7 ommatidia in the longest row. Otherwise as holotype.

Holotype worker, **Namibia**: Namib Desert, 15° 36′ E, 23° 04′ S, pitfall, sample P 17, 1984 (*A. C. Marsh*) (BMNH).

Paratypes. 2 workers with same data as holotype (BMNH; MCZ).

Non-paratypic material examined. **Namibia**: Namib Desert, 15° 36′ E, 23° 04′ S, sample P 20 (*A. C. Marsh*). As holotype but lighter in colour, medium brown with the gaster darker. The head and alitrunk are approximately the same shade.

All six small species in the *mediocre*-complex show relatively feeble or very reduced cephalic sculpture and almost non-existent dorsal pilosity. Of the six *nirvanum* retains a single pair of backward directed hairs on the petiole, which is absent in the remainder. *M. rabirium*, *osiridis* and *zulu* have eyes which are situated distinctly in front of the midlength of the sides of the head. The two remaining, *mediocre* and *esharre*, are separated by the characters noted in the key and under *mediocre*.

Monomorium excelsior Arnold **stat. n.**

Monomorium tchelichofi var. *excelsior* Arnold, 1926: 227. Syntype workers, males, South Africa: Cape Prov., Matroosberg, Hex River Mts, 5500–7000 ft (= 1677–2134 m), i.1917 (*R. W. Tucker*) (BMNH) [examined].

Monomorium (Xeromyrmex) speculiceps Santschi, 1928: 191, fig. 3a. Holotype worker, South Africa: Cape Prov., Hermanus (*Lockee-Bayne*) (NMB) [examined]. **Syn. n.**

Worker. TL 3·3–3·5, HL 0·84–0·92, HW 0·64–0·72, CI 76–80, SL 0·78–0·82, SI 114–122, PW 0·42–0·47, AL 0·96–1·06 (5 measured).

Anterior margin of median portion of clypeus transverse to extremely shallowly concave in full-face view, never notched medially. Eyes of moderate size, the maximum diameter 0·22–0·25 × HW and with 10 ommatidia in the longest row. Antennal scapes relatively long, SI > 110. Alitrunk appearing long and low in profile, the promesonotal dorsum forming an even shallow convexity from front to back and sloping posteriorly to the weakly impressed metanotal groove. Petiole node cuneate in profile, narrowly rounded above. Cephalic dorsum behind the frontal lobes with 3–4 pairs of hairs straddling the midline, the occipital margin with a further 2–3 pairs arranged in a roughly transverse row; the outermost of these hairs very close to the occipital corner. A single pair of relatively long standing hairs present at the pronotal humeri and another, shorter, pair situated anteriorly on the mesonotal dorsum. Petiole node with one pair of backward directed hairs, postpetiole with 3–4 pairs. First gastral tergite with standing hairs numerous and distributed more or less evenly over the sclerite. Head smooth and very glossy, sculptured only with faint vestiges of fine superficial reticular patterning. Pronotal dorsum with superficial reticular patterning or with feeble reticulation. Mesonotum as pronotum or the reticulation somewhat more distinct. Propodeal dorsum weakly shagreenate-punctulate. Sides of alitrunk reticulate to reticulate-shagreenate, the pronotum much more weakly sculptured than the remainder. First gastral tergite unsculptured or with faint superficial reticulate patterning basally. Colour glossy chestnut-brown.

First described by Arnold (1926) as a variety of *tchelichofi*, *excelsior* clearly ranks as a separate species. Not only do the two have very different distributions of pilosity but also their dimensions show marked differences. Compare the measurements given above with those of *tchelichofi* (HW 0·74–0·82, CI 82–86, SI 95–100). Also the eyes of *tchelichofi* tend to be somewhat smaller, maximum diameter 0·20–0·23 × HW, and the dorsal alitrunk is more evenly and more strongly sculptured than in *excelsior*.

Material examined

South Africa: Cape Prov., Matroosberg (*R. W. Tucker*); Hermanus (*Lockee-Bayne*).

Monomorium fridae Forel **stat. n.**

Monomorium medinae r. *fridae* Forel, 1905: 183. Holotype worker, South Africa: Cape Prov., Willowmore (*H. Brauns*) (MHN) [examined].

Worker. TL 3·1–3·2, HL 0·84–0·85, HW 0·67–0·68, CI 80–81, SL 0·68–0·70, SI 101–103, PW 0·40–0·42, AL 0·90–0·93 (3 measured).

Anterior margin of median portion of clypeus evenly concave. Sides of head notably convex in full-face view, the eyes situated at the widest point. Maximum diameter of eye 0·20–0·22 × HW, with 9 ommatidia in the longest row. Occipital margin of head very shallowly concave. With alitrunk in profile the promesonotal dorsum evenly convex, sloping posteriorly to the very feebly marked and scarcely impressed metanotal groove. Dorsum of propodeum flattened but not obviously concave, the dorsal surface rounding into the sides without distinct lateral marginations or carinae. Nodes of petiole and postpetiole in dorsal view both transversely elliptical, broader than long. Cephalic dorsum with 3–4 pairs of hairs which straddle the midline behind the level of the frontal lobes; without standing hairs at the occipital corners. Dorsal alitrunk without standing hairs. Petiole node with one pair and postpetiole with 1–2 pairs of backward directed hairs. First gastral tergite with numerous hairs in front of the apical transverse row, these hairs widely separated but distributed more or less evenly over the sclerite. Dorsum of head shining, unsculptured except for a fine faint superficial reticular patterning everywhere. Promesonotal dorsum sculptured as head but the patterning usually more strongly marked, especially on the posterior portion of the mesonotum. Propodeal dorsum shallowly and weakly punctulate-granular. First gastral tergite shining, with faint superficial reticulate patterning. Colour uniform brown, the gaster the same colour as, or slightly darker than, the alitrunk.

M. fridae is given new status here as a valid species, reflecting the fact that it is not closely related to the Canary Island species *medinae*, a very specialized form known only from those islands. The real affinities of

fridae lie within the *tchelichofi*-complex and indeed *fridae* may be a senior synonym of *tchelichofi* itself. The two are remarkably similar in all respects except for size, *fridae* being a slightly smaller species with a fractionally narrower head and marginally longer scapes. Both share the same type-locality. Because of shortage of material referable to either name I have opted to keep them as separate species for the time being, but I strongly suspect that the acquisition of further samples will show *fridae* and *tchelichofi* to be synonymous by bridging the slight size gap shown in presently available material.

MATERIAL EXAMINED

South Africa: Cape Prov., Willowmore (*H. Brauns*); Doorn Riv. (*T. D. A. Cockerell*).

Monomorium herero Forel **stat. n.**

Monomorium salomonis subsp. *herero* Forel, 1910*c*: 16. Syntype workers, female, NAMIBIA: Possession I., v.1903 (*L. Schultze*) (MHN; BMNH) [examined].

WORKER. TL 2·8–3·1, HL 0·70–0·78, HW 0·58–0·64, CI 78–83, SL 0·57–0·64, SI 99–100, PW 0·34–0·40, AL 0·80–0·90 (7 measured).

Median portion of clypeus with its anterior free margin transverse, not concave or indented. Maximum diameter of eye 0·24–0·26 × HW and with 10–11 ommatidia in the longest row. Sides of head evenly convex in full-face view, the occipital margin shallowly concave. Metanotal groove not or only very feebly impressed. Propodeal dorsum with a flattened triangular area, not concave, lacking sharp margins or rims to the triangular area. Dorsum of head with 2–3 pairs of standing hairs behind the level of the frontal lobes and with another pair situated close to the occipital corners. Dorsal alitrunk without standing hairs. Petiole with a single pair and postpetiole with 1–2 pairs of backward directed hairs. First gastral tergite with 2 pairs of hairs present in front of the apical transverse row, situated at approximately one-third and one-half of the length of the sclerite. Dorsum of head sculptured with reticulation only. Promesonotal dorsum reticulate anteriorly, the sculpture becoming stronger posteriorly and approaching the reticulate-punctate condition of the propodeal dorsum. First gastral tergite with faint superficial reticulate patterning only, shining. Sides of pronotum finely reticulate, remainder of sides of alitrunk reticulate-punctate. Colour uniform dark brown.

Known only from the syntypic series collected on Possession Island off the coast of Namibia, *herero* remains an enigmatic species. It appears to be related to the South African *willowmorense* and the Namibian *kitectum*, but in both of these the cephalic sculpture is vestigial. Besides this *kitectum* is smaller than *herero* and has relatively larger eyes (HW 0·43–0·45, maximum diameter of eye 0·29–0·31 × HW), and *willowmorense* has decidedly shorter scapes (SI 88–93). In overall appearance *herero* approaches *subopacum*, but has the head much less strongly sculptured and lacks the median clypeal notch or impression characteristic of the latter.

MATERIAL EXAMINED

Namibia: Possession I. (*L. Schultze*).

Monomorium hirsutum Forel **stat. n.**

Monomorium bicolor subsp. *hirsutum* Forel, 1910*d*: 251. Syntype workers, ETHIOPIA: Nefassit (*K. Escherich*) (MHN; BMNH) [examined].

WORKER. TL 3·2–3·4, HL 0·76–0·82, HW 0·62–0·67, CI 81–83, SL 0·62–0·68, SI 99–103, PW 0·40–0·44, AL 0·90–1·00 (6 measured).

Prominent median portion of clypeus with its anterior margin shallowly concave. Eyes smaller than in any other member of the *bicolor*-complex, the maximum diameter 0·19–0·21 × HW and with 9–10 ommatidia in the longest row. Petiole and postpetiole nodes about equal in width in dorsal view (*ca* 0·20–0·22), each distinctly transverse, anteroposteriorly compressed and broader than long. Propodeal dorsum slightly longitudinally impressed medially but lacking lateral carinae or marginations. Dorsum of head, entirety of alitrunk, petiole and postpetiole, all evenly densely reticulate-punctate, the punctures small, very crowded and all sharply defined. First gastral tergite shagreenate, the sculpture densest basally and fading apically. Dorsal surfaces of head, promesonotum, propodeum, petiole, postpetiole and gaster all with numerous fine standing hairs which are erect to subdecumbent and very dense; the propodeal dorsum with 5–6 pairs of hairs. Occipital margin of head in full-face view with projecting hairs across its entire width. Sides of head behind eyes with 1–2 pairs of projecting hairs in front of each occipital corner

which are closer to the corner than to the eye. Head, alitrunk, petiole and postpetiole orange-yellow to orange-red, the gaster blackish brown to black.

Known only from the type-series, *hirsutum* has been treated to the present as a subspecies of *bicolor*. It is, however, conspicuously densely hairy, in contrast to *bicolor* which lacks hairs on the dorsal alitrunk and has only sparse gastral pilosity. *M. hirsutum* also has shorter scapes and smaller eyes than *bicolor*, as follows.

M. bicolor SI 104–115, maximum diameter of eye 0·24–0·27 × HW;

M. hirsutum SI 99–103, maximum diameter of eye 0·19–0·21 × HW.

The closest relative of *hirsutum* appears to be an unidentified species from South Yemen (in BMNH) which matches *hirsutum* in colour, pilosity and general appearance, but which has erect pubescence on the scapes, even smaller eyes, and a deeply impressed metanotal groove followed by a conspicuously convex propodeal dorsal outline. In *hirsutum* the metanotal groove is very shallow and the propodeal dorsum is more or less flat in profile, approximately continuing the line of the promesonotum.

M. hirsutum is easily distinguished from all other Afrotropical members of the *bicolor*-complex as it is the only species to have hairs present on the propodeum. Only one other species in the entire *salomonis*-group, as represented in sub-Saharan Africa, has the propodeum densely hairy, *albopilosum*, but this is quickly distinguished by the characters noted in the key.

Material examined

Ethiopia: Nefassit (*K. Escherich*).

Monomorium ilgii Forel

Monomorium ilgii Forel, 1894*a*: 84. Syntype workers, Ethiopia: 'Südabessinien' (*Ilg*) (MHN; BMNH) [examined].

Worker. TL 2·7–3·1, HL 0·66–0·78, HW 0·51–0·60, CI 76–77, SL 0·52–0·62, SI 102–105, PW 0·34–0·38, AL 0·76–0·90 (3 measured).

Anterior margin of median portion of clypeus shallowly concave. Eyes relatively large and very conspicuous, the maximum diameter 0·33 × HW and with 9–11 ommatidia in the longest row. Sides of head evenly shallowly convex in full-face view, the convexity more marked in larger than in smaller workers. Occipital margin broadly but shallowly concave. Promesonotum in profile flat to shallowly convex dorsally, the metanotal groove only extremely feebly impressed. Propodeal dorsum flat to shallowly concave between the lateral marginations. Petiole node high and narrow in profile; both nodes narrow from front to back and conspicuously transverse in dorsal view, much broader than long. Cephalic dorsum with 4–5 pairs of hairs straddling the midline behind the frontal lobes, and the occipital margin with another pair situated close to the corners. Pronotal dorsum with 2–3 pairs of standing hairs, and larger workers also with a pair on the mesonotum. Propodeal dorsum without standing hairs. Petiole node with one pair and postpetiole with 3 pairs of elongate hairs. First gastral tergite with numerous standing hairs which are more or less evenly distributed over the entire sclerite. Head smooth, unsculptured except for very faint superficial reticular patterning. Pronotal dorsum similar to head but mesonotum with more conspicuous but still superficial reticulation. Propodeal dorsum with weakly reticulate-granulate sculpture. Sides of alitrunk behind the glossy pronotum weakly reticulate to reticulate-granulate. First gastral tergite unsculptured or at most with vestigial reticulate patterning basally. Colour uniform yellow.

This distinctive species keys out with *excelsior* and superficially the two appear to be closely related. For this reason I have included *ilgii* in the *tchelichofi*-complex, but I suspect that *ilgii* may have come to resemble *excelsior* convergently. Little more can be said at present as both are known only from their short type-series.

Material examined

Ethiopia: 'Südabessinien' (*Ilg*).

Monomorium junodi Forel **stat. n.**

Monomorium salomonis subsp. *junodi* Forel, 1910*b*: 441. Syntype workers, South Africa: Transvaal, Shiluvane (*Junod*) (MHN) [examined].

Monomorium delagoense var. *pretoriensis* Arnold, 1944: 15. Holotype female, paratype workers, South Africa: Pretoria, xii.1925 (*J. C. Faure*) (BMNH) [workers examined]. **Syn. n.**

WORKER. TL 2·8–3·6, HL 0·70–0·94, HW 0·56–0·80, CI 79–87, SL 0·52–0·70, SI 85–100, PW 0·38–0·50, AL 0·80–1·02 (30 measured).

Median portion of clypeus with anterior free margin shallowly concave. Eyes of moderate size, the maximum diameter 0·22–0·25 × HW, with 9–11 ommatidia in the longest row. Posteroventral occipital angles broadly and evenly rounded. Metanotal groove narrow and feebly impressed. Propodeal dorsum flat to shallowly concave longitudinally, the lateral margins of the propodeum often sharply defined, in some samples represented by a pair of carinae. In general the more concave the propodeal dorsum the more sharply defined are the lateral margins. Petiole node in dorsal view anteroposteriorly compressed, its dorsal surface narrow. Dorsum and sides of head, entire alitrunk, petiole and postpetiole sharply reticulate-punctate. First gastral tergite reticulate to shagreened. Area of head between and immediately behind the frontal lobes usually finely longitudinally striate. Dorsum of head with several pairs of standing hairs behind the level of the frontal lobes. Promesonotum dorsally with at least a single pair of hairs (at the pronotal humeri), more often with up to 5 or 6 pairs present. Propodeal dorsum hairless. Petiole with 1–2 and postpetiole with 2–3 pairs of backward directed hairs. First gastral tergite with numerous standing hairs which are evenly distributed over the sclerite in front of the apical transverse row. Colour uniform medium to dark brown, often with the gaster darker in shade.

Among the Afrotropical members of the *salomonis*-group nine species have standing hairs present on the dorsal alitrunk. They are found in *junodi*, *hirsutum*, *albopilosum*, *excelsior*, *pharaonis*, *delagoense*, *vatranum*, *marshi*, and some populations of *rufulum*. Alitrunk hairs may be numerous or may be restricted to a single pair at the pronotal humeri. *M. junodi* is isolated from this assemblage by the characters discussed in the introduction to the *salomonis*-group and those indicated in the key to species.

The distribution of *junodi* appears to be restricted to southern Africa, it having been recorded only from Botswana, Zimbabwe and South Africa, and its closest relative appears to be *delagoense*, from which it is separated by its much coarser sculpture. In *junodi* the cephalic dorsum is evenly blanketed with dense, sharply defined reticulate-punctate sculpture, as is the entire alitrunk both dorsally and laterally, so that the intensity of sculpture on the dorsal head and alitrunk is approximately the same. In *delagoense* the cephalic dorsum is finely shagreenate to superficially reticulate, the sculpture much effaced and conspicuously less dense and intense than the sharply reticulate-punctate dorsal alitrunk.

Four workers of *junodi* in the BMNH collection are labelled as types of *M. afrum* var. *faurei* Arnold [South Africa: Pretoria, Rosslyn, xii.1925 (*J. C. Faure*).] This is merely a manuscript name, never having been published by Arnold. The specimens in question bear no relationship to *faurei* Santschi (= *exiguum*), from Gabon, nor should they be associated with *afrum*. The name occurs, however, in Samways (1983), as *faurei* Arnold; the correct identity of Samway's material is *junodi*.

MATERIAL EXAMINED

Botswana: Xani Pan (*A. Russell-Smith*); Okavango Delta, Smiti (*A. Russell-Smith*); Shorobe (*A. Russell-Smith*); Serowe (*P. Forchhammer*). **Zimbabwe**: Bulawayo (*G. Arnold*); Umtali (*G. Arnold*); Bembesi (*G. Arnold*); Victoria Falls (*G. Arnold*); Victoria Falls (*W. L. Brown*); Harare (*A. Watsham*). **South Africa**: Transvaal, Shiluvane (*Junod*); Nelspruit (*M. Samways*); Pretoria (*G. Arnold*); Pretoria, Rosslyn (*J. C. Faure*).

Monomorium kitectum sp. n.

(Fig. 49)

HOLOTYPE WORKER. TL 2·3, HL 0·60, HW 0·45, CI 75, SL 0·46, SI 102, PW 0·30, AL 0·70.

Anterior free margin of median portion of clypeus transverse to extremely feebly convex, not indented medially. Head in full-face view with sides very shallowly convex and occipital margin almost transverse, with only the shallowest degree of concavity. Eyes relatively large, the maximum diameter 0·31 × HW and with 9 ommatidia in the longest row. With the alitrunk in profile the promesonotal dorsal outline almost flat behind the anterior curvature and sloping shallowly to the metanotal groove; the latter almost unimpressed, making only the slightest of indentations in the outline. Dorsum of propodeum flattened but not impressed, the dorsum rounding narrowly into the sides but without margination. Petiole and postpetiole in dorsal view of approximately equal width, the latter only fractionally broader than the former. Petiole in profile with the node cuneate, very narrowly rounded dorsally. Subpetiolar process indistinct, forming a low inconspicuous flange which runs back almost to the level of the spiracle. In profile the cephalic dorsum with appressed sparse pubescence but without standing hairs behind the level of the frontal lobes. Ventral surface of head with some fine projecting hairs. Dorsal alitrunk without standing hairs. Petiole and postpetiole each with one pair of backward directed hairs. First gastral tergite with sparse appressed pubescence, lacking hairs except for a single pair at about the midlength and a transverse row at the apex of

the sclerite. Dorsum of head polished and shining, the surface with an extremely faint superficial reticular patterning only. Promesonotal dorsum reticulate anteriorly, the sculpture becoming denser posteriorly. Propodeal dorsum reticulate to feebly reticulate-shagreenate. Sides of pronotum superficially reticulate as head, remainder of alitrunk sides more strongly reticulate or reticulate-shagreenate. First gastral tergite very faintly superficially reticulate, shining. Colour brown, the head and gaster darker in shade than the alitrunk, petiole and postpetiole.

PARATYPE WORKERS. TL 2·2–2·3, HL 0·58–0·60, HW 0·43–0·45, CI 73–75, SL 0·44–0·46, SI 100–102, PW 0·30–0·32, AL 0·68–0·70 (5 measured). As holotype but in two the first gastral tergite with another pair of hairs, sited between the base and the pair at the tergal midlength. In one paratype the alitrunk is almost as dark in colour as the head and gaster, and in another the subpetiolar process is slightly convex, forming a low elongate lobe rather than a straight-edged flange. Maximum diameter of eye 0·29–0·31 × HW, with 8–9 ommatidia in the longest row.

Holotype worker, **Namibia**: Namib Desert, 15° 36′ E, 23° 04′ S, sample P 22, pitfall, 1984 (*A. C. Marsh*) (BMNH).

Paratypes. 5 workers with same data as holotype (BMNH; MCZ).

A relatively small but conspicuous species closely related to *willowmorense* but separated from it by the numerous characters indicated in the key.

Monomorium mantazenum sp. n.

HOLOTYPE WORKER. TL 2·7, HL 0·70, HW 0·53, CI 76, SL 0·62, SI 117, PW 0·34, AL 0·82.

Anterior margin of median portion of clypeus with a very small median indentation. Head in full-face view with sides roughly parallel to slightly anteriorly divergent in front of the eyes, distinctly convergent posteriorly behind the eyes. Occipital margin concave medially. Eyes of moderate size, the maximum diameter 0·26 × HW and with 9 ommatidia in the longest row. Antennal scapes relatively long, SI > 115. Pronotal dorsum in profile convex anteriorly, the posterior portion of the pronotum and the mesonotum forming a single almost flat surface which slopes posteriorly. Metanotal groove not impressed, the propodeal dorsum on a lower level than the mesonotum. Propodeal dorsum flattened, the margins separating dorsum and sides very feebly delimited. Petiole node in profile small and low, bluntly cuneate in shape. Cephalic dorsum in holotype with only a single pair of standing hairs behind the level of the frontal lobes, this pair situated close to the occipital margin (the holotype is most probably slightly abraded, see under paratypes below). Dorsal alitrunk without standing hairs. Petiole and postpetiole each with one pair of backward directed hairs. First gastral tergite with hairs scattered but more or less evenly distributed over the sclerite in front of the apical transverse row. Dorsum of head roughly reticulate to reticulate-granulate everywhere. Pronotal dorsum reticulate, the edges of the reticulations becoming raised and more sharply defined posteriorly on the mesonotum; propodeum weakly reticulate-punctate dorsally. Sides of pronotum with superficial reticular patterning, remainder of sides of alitrunk reticulate to shallowly reticulate-punctate. First gastral tergite glossy, with superficial reticular patterning only. Colour black to blackish brown, the mandibles dull yellow.

PARATYPE WORKERS. TL 2·8–3·0, HL 0·74–0·80, HW 0·55–0·60, CI 74–77, SL 0·66–0·72, SI 117–122, PW 0·34–0·39, AL 0·85–0·92 (9 measured). Maximum diameter of eye 0·26–0·28 × HW, with 9–10 ommatidia in the longest row. As holotype but dorsum of head with 2–3 pairs of hairs straddling the midline behind the level of the frontal lobes. Colour of mandibles varying from dull yellow to light brown. Petiole node dorsally more broadly rounded in some paratypes than in holotype. Body colour may be uniformly black or blackish brown, or the gaster may be a different shade to the head and alitrunk. The median indentation of the clypeus, feeble in the holotype, is absent in some paratypes.

Holotype worker, **Namibia**: Namib Desert, 14° 51′ E, 23° 01′ S, pitfall, sample P 12, 1984 (*A. C. Marsh*) (BMNH).

Paratypes. 2 workers with same data as holotype; 3 workers with same data but 14° 39′ E, 22° 59′ S, sample P 13; 4 workers, Namib Desert, Swartbank, 14° 50′ E, 23° 16′ S, sandy plain, 1.x.1981, sample 174 (*A. C. Marsh*) (BMNH; MCZ).

Non-paratypic material examined. **Namibia**: Skeleton Coast, Ugab River (*S. Braine*). This sample matches the type-series in all respects except for its colour, it being dark brown rather than blackish brown to black.

Within the *viator*-complex *mantazenum* is differentiated by its relatively small eyes, uniformly dark colour and lack of hairs on the alitrunk.

Monomorium marshi sp. n.

(Figs 50, 53)

HOLOTYPE WORKER. TL 3·1, HL 0·76, HW 0·54, CI 71, SL 0·68, SI 126, PW 0·38, AL 0·94.

Anterior margin of median portion of clypeus shallowly convex. Head in full-face view with sides weakly divergent in front of eyes and weakly convergent behind them, the occipital margin broadly but shallowly concave. Maximum diameter of eye 0·30 × HW, with 12 ommatidia in the longest row. Head relatively long and narrow, scapes relatively very long (CI and SI, above). Alitrunk long and low in profile, with promesonotal dorsum evenly shallowly convex and sloping posteriorly to the unimpressed metanotal groove. Propodeal dorsum long and low, distinctly on a much lower level than the promesonotum. Node of petiole in profile small and quite low, the anterior peduncle of the petiole lacking a conspicuous anteroventral process, having instead merely a short very low ridge. Cephalic dorsum with 4–5 pairs of erect hairs straddling the midline behind the level of the frontal lobes, and with a transverse row of 6 standing hairs along the occipital margin, the outermost of which is close to the occipital corner on each side. Pronotal and mesonotal dorsa both with standing hairs present, the hairs longer and denser on the former than on the latter. Propodeal dorsum without hairs. There is variation in distribution of pilosity, see paratype discussion below. Nodes of petiole and postpetiole each with 2 pairs of backward directed hairs. First gastral tergite with numerous but widely spread hairs present in front of the apical transverse row, the hairs more or less evenly distributed over the entire sclerite. Dorsum of head finely reticulate to reticulate-shagreenate. Dorsal alitrunk more sharply reticulate to finely reticulate-punctate everywhere. Sides of alitrunk reticulate-punctate except for the pronotum, which is less strongly sculptured. First gastral tergite with fine superficial reticulate patterning only. Head and alitrunk dull orange-brown, gaster black and glossy.

PARATYPE WORKERS. TL 2·7–3·2, HL 0·68–0·76, HW 0·47–0·55, CI 70–74, SL 0·62–0·68, SI 120–130, PW 0·32–0·39, AL 0·80–0·98 (11 measured). Maximum diameter of eye 0·28–0·31 × HW, with 11–13 ommatidia in the longest row. Variation in pilosity shows the head with 3–5 pairs straddling the midline behind the level of the frontal lobes; occipital margin with a transverse row of 4 or 6 hairs; pronotum with 4–5 pairs of hairs; mesonotum with 0–2 pairs; propodeum usually hairless but with a single pair in one specimen; petiole node with 1–2 pairs; postpetiole with 2 pairs. Colour varies from light orange with a dark brown gaster, to dull orange-brown with a black gaster.

Holotype worker, **Namibia**: Namib Desert, 15° 18′ E, 23° 06′ S, pitfall, sample P 11, 1984 (*A. C. Marsh*) (BMNH).

Paratypes. 5 workers with same data as holotype; 3 workers with same data but 15° 36′ E, 23° 04′ S, sample P 10; 3 workers, Mirabeb, 8.iv.1982, sample M 12 (*A. C. Marsh*) (BMNH; MCZ).

The long antennal scapes, distinctive colour pattern and presence of hairs on the dorsal alitrunk make this Namib Desert species immediately recognizable. Its closest relative within the *viator*-complex appears to be *vatranum*, but this is a uniformly darkly coloured species with shorter scapes, and its alitrunk pilosity is restricted to a single pair of hairs at the pronotal humeri.

Monomorium mediocre Santschi

Monomorium mediocre Santschi, 1920*a*: 376, fig. 13. Syntype workers, SOUTH AFRICA: Kimberley (*G. Arnold*) (BMNH) [examined].

WORKER. TL 1·9–2·0, HL 0·50–0·54, HW 0·41–0·43, CI 80–84, SL 0·37–0·39, SI 90–93, PW 0·26–0·27, AL 0·54–0·56 (7 measured).

Median portion of clypeus with the anterior margin transverse to shallowly convex. With the head in full-face view the sides more or less evenly shallowly convex and the occipital margin shallowly concave medially. Eyes at midlength of sides, the maximum diameter of the eye 0·21–0·24 × HW and with 6–8 ommatidia in the longest row. Promesonotal dorsal outline convex in profile, sloping posteriorly to the metanotal groove which is feebly or not impressed. Dorsum of head without standing hairs behind level of the frontal lobes. Dorsal alitrunk without standing hairs. Petiole node lacking hairs but postpetiole with a single backward directed pair. First gastral tergite hairless except for the apical transverse row. Dorsum of

head with extremely faint superficial reticular patterning, which is almost effaced. Pronotum with superficial reticular patterning, which is almost effaced. Pronotum with superficial reticular patterning, the mesonotum posteriorly somewhat more strongly reticulate and the propodeum very finely granulate to weakly punctulate-shagreenate. First gastral tergite only superficially marked with faint reticular patterning. Colour uniformly yellow to very light brown, frequently the gastral tergites behind the first darker in shade than the first.

This small yellowish species with very reduced sculpture and pilosity appears to be closely related to the Namibian *esharre* and *nirvanum*. The last named is easiest distinguished by its retention of a pair of hairs on the petiole node, which is absent in the other two. *M. mediocre* and *esharre* are separated by their differences in cephalic index, eye size, and relative position of eyes which in *esharre* are slightly in front of the midlength of the sides.

Material examined

Zimbabwe: Umgusa Riv., Sawmills (*G. Arnold*); Igusi (*G. Arnold*). **South Africa**: Kimberley (*G. Arnold*).

Monomorium micropacum sp. n.

Holotype worker. TL 2·4, HL 0·62, HW 0·48, CI 77, SL 0·50, SI 104, PW 0·34, AL 0·70.

Anterior free margin of median portion of clypeus concave. Maximum diameter of eye 0·21 × HW and with 8 ommatidia in the longest row. Sides of head feebly convex in full-face view and somewhat convergent posteriorly, so that the head is slightly narrower across the occipital corners than immediately behind the eyes. Dorsum of pronotum convex anteriorly but the posterior portion of the pronotum and the mesonotum more or less flat or even very shallowly concave in profile, sloping posteriorly to the distinctly impressed metanotal groove. Propodeal dorsum in profile more steeply sloping than the mesonotum, the dorsum and declivity meeting in a broadly rounded angle. Propodeal dorsum approximately flat transversely between the blunt, posteriorly divergent marginations which separate dorsum from sides. Peduncle of petiole with a very narrow strip-like ventral process. Dorsum of head with three pairs of standing hairs behind the level of the frontal lobes. Dorsal alitrunk without standing hairs; petiole with one pair, postpetiole with two pairs of hairs. First gastral tergite evenly pilose, with 10 or more pairs of hairs in front of the apical transverse row. Dorsum of head from level of posterior margins of eyes to occipital margin blanketed by fine and dense reticulate-punctate sculpture, the punctures all sharply defined and decreasing slightly in size posteriorly; without other sculpture on head except for a few very fine striae between the frontal lobes and spanning the cephalic midline immediately behind the frontal lobes. All dorsal and lateral surfaces of alitrunk finely and sharply densely reticulate-punctate. Petiole and postpetiole reticulate-punctate to reticulate-granulate, the sculpture not quite as sharply defined as on the alitrunk. First gastral tergite very finely and densely shagreenate basally, apically this sculpture reducing to fine superficial reticulation only. Colour a uniform dull light brown, the cephalic dorsum slightly darker in shade than the rest of the body.

Paratype worker. TL 2·3, HL 0·61, HW 0·48, CI 79, SL 0·51, SI 106, PW 0·33, AL 0·68. As holotype but maximum diameter of eye 0·23 × HW, again with 8 ommatidia in the longest row. Colour darker brown than the holotype and more nearly the same shade everywhere, perhaps implying that the holotype had not achieved its full adult colouring.

Holotype worker, **South Africa**: Natal, Umlalazi Nat. Res., 25.iii.1979 (*D. J. Brothers*) (BMNH).
Paratype. 1 worker with same data as holotype (BMNH).

This South African species resembles a smaller version (compare measurements) of *opacum* and has a much more densely hairy gaster. Where *opacum* has only 1–2 pairs of hairs on the first tergite *micropacum* has about 10 in front of the apical transverse row. On the head *micropacum* has 3 pairs of standing hairs behind the level of the frontal lobes where *opacum* has none or at most one pair, close to the occipital margin.

Monomorium minor Stitz stat. n.

Monomorium salomonis var. *minor* Stitz, 1923: 156. Syntype workers, Namibia: Farm Neudamm, 10–15.v.1911 (*Michaelsen*); Kuibis, 15.vii.1911 (*Michaelsen*) (not found in MNHU, presumed lost).

WORKER. TL 2·6–2·9, HL 0·68–0·70, HW 0·49–0·51, CI 70–74, SL 0·54–0·58, SI 112–116, PW 0·34–0·37, AL 0·78–0·84 (8 measured).

Median portion of clypeus with anterior margin transverse to very shallowly concave, sometimes with a minute notch medially. Maximum diameter of eye 0·28–0·30 × HW, and with 8–9 ommatidia in the longest row. Sides of head weakly convergent behind the eyes and the occipital margin shallowly concave medially in full-face view. Promesonotum shallowly convex in profile, the mesonotum sloping weakly to the very feebly impressed metanotal groove. Propodeal dorsum flattened to weakly impressed, the lateral margins bluntly indicated. Dorsum of head with 2 pairs of standing hairs present behind the level of the frontal lobes; the first pair situated just behind the level of the eyes, the second pair at the occipital margin. Dorsal alitrunk without standing hairs; the petiole with one pair and the postpetiole with two pairs of backward directed hairs. First gastral tergite with hairs evenly distributed over the sclerite in front of the apical transverse row. Cephalic dorsum opaque and with a roughened and silky appearance, the sculpture finely reticulate-shagreenate to punctulate-shagreenate, usually mid-dorsally with superimposed extremely fine scratch-like longitudinal striolae. Dorsal alitrunk finely reticulate-shagreenate on pronotum, grading to feebly punctulate-shagreenate on the propodeum. Colour uniform dull yellow, often with the sides and posterior margin of the first gastral tergite, and the succeeding tergites, slightly darker.

As far as can be ascertained no syntypes of this species remain in existence. The original description of *minor* is short and quite vague, saying merely, '2mm. Smaller than typical form [i.e. *salomonis*]. Head narrower; antennal scape overreaching occipital margin by its own thickness. Petiole node with peduncle somewhat shorter. Yellow with brownish tint, the gaster in some samples somewhat darkened.'

I have not seen any Namibian specimens matching this description but a series from Porto Alexandre, in south-eastern Angola, fits fairly well and so I have applied the name *minor* to this series, as reflected in the diagnosis given above.

MATERIAL EXAMINED

Angola: Porto Alexandre (*P. Hammond*).

Monomorium nirvanum sp. n.

HOLOTYPE WORKER. TL 2·2, HL 0·58, HW 0·46, CI 79, SL 0·46, SI 100, PW 0·30, AL 0·62.

Median portion of clypeus with its anterior margin transverse to very feebly convex. Head in full-face view with sides very shallowly convex and with the occipital margin broadly but extremely shallowly concave, almost transverse. Eyes at midlength of sides of head, the maximum diameter 0·26 × HW and with 10 ommatidia in the longest row. Alitrunk in profile with the promesonotal dorsum convex anteriorly and sloping posteriorly. The metanotal groove not impressed but the propodeal dorsum distinctly on a much lower level than the promesonotum. Cephalic dorsum without standing hairs behind the level of the frontal lobes. Dorsal alitrunk lacking standing hairs. Petiole node and postpetiole each with a single pair of backward directed hairs. First gastral tergite hairless except for the apical transverse row. Dorsum of head sculptured with very faint superficial reticular patterning only, the marking almost effaced. Pronotum with superficial reticular patterning, the sculpture becoming more conspicuous posteriorly though still very feeble. Propodeum weakly reticulate to granular. First gastral tergite with superficial reticular patterning only. Colour uniform light yellowish brown.

PARATYPE WORKER. TL 2·1, HL 0·53, HW 0·43, CI 81, SL 0·41, SI 95, PW 0·26, AL 0·59. Maximum diameter of eye 0·28 × HW and with 9 ommatidia in the longest row. Otherwise as holotype.

Holotype worker, **Namibia**: Namib Desert, 15° 19′ E, 23° 43′ S, dunes, sample V 2154, 2.iii.1982 (*S. Simleit*) (BMNH).

Paratype. 1 worker with same data as holotype (MCZ).

A very distinctive small species of the *salomonis*-group as represented in sub-Saharan Africa, the Namibian *nirvanum* is characterized by its lack of pilosity on the first gastral tergite (apart from the apical transverse row), its extremely reduced cephalic sculpture, the position of its eyes, and retention of a single pair of hairs on both the petiole and postpetiole whilst all standing hairs have been lost from the alitrunk and from the cephalic dorsum behind the frontal lobes. *M. nirvanum* falls into the *mediocre*-complex.

Monomorium ocellatum Arnold

Monomorium (Xeromyrmex) salomonis st. *ocellatum* Arnold in Santschi, 1920*a*: 377. Syntype workers, females, South Africa: Cape Prov., Willowmore (*H. Brauns*, *G. Arnold*) (BMNH; NMB) [examined].
Monomorium ocellatum Arnold; Arnold, 1944: 14. [Raised to species.]

Worker. TL 3·1–3·7, HL 0·76–0·86, HW 0·60–0·69, CI 77–82, SL 0·60–0·70, SI 100–103, PW 0·43–0·48, AL 0·92–1·06 (8 measured).

Anterior free margin of median portion of clypeus approximately transverse to concave. Eyes of moderate size, the maximum diameter 0·25–0·27 × HW and with 10–11 ommatidia in the longest row. Several workers in the type-series with a conspicuously developed median ocellus, but in others this is very small and in a few is vestigial. In general the ocellus is largest in large workers, but the variation seen in the type-series suggests that specimens lacking the ocellus may be found. Occipital margin of head conspicuously indented in full-face view. Promesonotum convex in profile, the highest point of the outline being at the junction of pro- and mesonotum, behind which the mesonotum slopes downwards to the narrowly impressed metanotal groove. Propodeal dorsum flattened and shallowly transversely concave. Dorsum of head in profile with about 5 pairs of standing fine hairs behind the level of the frontal lobes. In fresh specimens more may be present, but all the syntypes show signs of abrasion. Dorsal alitrunk without standing hairs. Petiole with 1–2 and postpetiole with 2–3 pairs of fine backward directed hairs. First gastral tergite with fairly dense fine pilosity on the basal third, the least abraded specimens showing about 6 pairs in this area. An apical transverse row of hairs is present on the first tergite. The area between the transverse row and the basal cluster of hairs shows one or two hairs in a few syntypes and it is probable that several may be present in fresh specimens; all the syntypes, however, show marked abrasion in this area. Dorsum of head opaque, blanketed by extremely fine dense sculpture which is reticulate-shagreenate to densely silkily striolate-granular. Promesonotal dorsum similarly sculptured but with fine dense reticulate ground-sculpture showing through. Propodeal dorsum anteriorly as promesonotum but posteriorly becoming more obviously reticulate to reticulate-punctate. First gastral tergite superficially reticulate. Colour brown, the gaster distinctly darker than the alitrunk.

M. ocellatum is known only from the syntype series. It is closely related to *subopacum* but shows denser pilosity and finer sculpture than that species. The presence of a median ocellus in most of the worker syntypes should not be overstressed as a diagnostic feature because of its variable development even in the few workers available.

Material examined

South Africa: Cape Prov., Willowmore (*H. Brauns*).

Monomorium opacior sp. n.

Monomorium salomonis r. *junodi* var. *opacior* Forel, 1913*b*: 136. Syntype workers, Zimbabwe: Bulawayo, 3.xi.1912, no. 130 (*G. Arnold*) (BMNH; MHN) [examined]. [Unavailable name.]
Monomorium (Xeromyrmex) delagoense st. *junodi* var. *serenum* Santschi, 1928: 192. Syntype worker, male, Zimbabwe: Bulawayo, 26.xi.1914 (*G. Arnold*) (NMB) [examined]. [Unavailable name.]

Syntype workers. TL 2·2–2·4, HL 0·60–0·66, HW 0·47–0·50, CI 75–78, SL 0·48–0·52, SI 100–108, PW 0·32–0·34, AL 0·68–0·74 (6 measured).

Median portion of clypeus with anterior margin transverse, sometimes appearing very slightly convex. Sides of head in full-face view almost straight, only extremely feebly convex and somewhat convergent posteriorly. Occipital margin very shallowly concave. Eyes slightly in front of the midlength of the sides of the head, the maximum eye diameter 0·24–0·26 × HW, with 8–9 ommatidia in the longest row. Metanotal groove very feebly impressed. Dorsum of head with two pairs of standing hairs behind the level of the frontal lobes, the first situated just behind the level of the eyes, the second at the occipital margin. Dorsal alitrunk without standing hairs. Petiole node without hairs, the postpetiole with a single pair which projects backward. First gastral tergite with 1–2 pairs of hairs in front of the apical transverse row, situated on the basal half of the sclerite. Dorsum of head opaque, blanketed by fine and dense reticulate-shagreenate to punctate-shagreenate sculpture; mid-dorsally the sculpture with very fine dense longitudinal scratch-like striolae, giving the surface in this area a silky appearance. Pronotal dorsum finely reticulate to reticulate-shagreenate; posteriorly on the dorsal alitrunk the sculpture becoming more sharply reticulate or even weakly reticulate-punctate. First gastral tergite with superficial reticular patterning at least near the base, but this may fade out apically, leaving the sclerite featureless. Colour dull light brown, the gaster much darker brown and shining.

Syntypes, 10 workers, **Zimbabwe**: Bulawayo, 3.xi.1912, no. 130 (*G. Arnold*) (BMNH; MHN).

Non-syntypic material examined. **Zimbabwe**: 4 short series, Bulawayo (*G. Arnold*). **Botswana**: Okavango Delta, Shorobe (*A. Russel-Smith*). **South Africa**: Transvaal, Nelspruit (*M. Samways*).

Dimensions of non-paratypic material. TL 2·3–2·7, HL 0·56–0·68, HW 0·43–0·52, CI 74–78, SL 0·44–0·57, SI 102–110, PW 0·30–0·35, AL 0·64–0·80 (8 measured). Maximum diameter of eye 0·25–0·27 × HW and with 8–9 ommatidia in the longest row. As syntypes but in some the first gastral tergite with 3 pairs of hairs on the basal half. Development of fine striolate component of cephalic sculpture is variable; in some individuals it is conspicuous, in others virtually absent. Also variable is the extent of the superficial reticular patterning on the first gastral tergite and the colour, which ranges from dull yellowish brown to pale medium brown. The gaster is sometimes only marginally darker than the head and alitrunk in shade.

The species is described from a syntypic series as Arnold's original series are mounted flat on card and all individuals have suffered some damage and abrasion. For this reason it has not proved possible to select a holotype from the original material which exhibits all the diagnostics of the species.

Monomorium opacum Forel

Monomorium opacum Forel, 1913*a*: 333. Syntype workers, Zaire: Katanga (=Shaba), Shinsenda, 10.vi.1912 (*Bequaert*) (MHN; MRAC) [examined].

Worker. TL 3·3–3·5, HL 0·80–0·86, HW 0·64–0·72, CI 80–86, SL 0·60–0·68, SI 90–100, PW 0·42–0·46, AL 0·96–1·04 (12 measured).

Anterior free margin of median portion of clypeus transverse to shallowly convex. Maximum diameter of eye 0·22–0·25 × HW, with 10–11 ommatidia in the longest row. Metanotal groove only shallowly indented. Dorsum of propodeum flattened or shallowly concave, the posteriorly divergent lateral margins of the propodeum sometimes bluntly angular. Petiole bluntly conical in profile; in dorsal view the node somewhat broader than long and approximately the same width as the postpetiole. Dorsum and sides of head, entirety of alitrunk, petiole and postpetiole sharply densely reticulate-punctate everywhere. First gastral tergite finely shagreenate. Dorsum of head behind level of frontal lobes hairless or with a single pair close to the occipital margin. Dorsal alitrunk lacking hairs. Petiole with one pair and postpetiole with 1–2 pairs of backward directed hairs. First gastral tergite with 1–2 pairs of hairs in front of the apical transverse row. If only one pair present it is at the midlength of the tergite; when a second pair also occurs it is usually between the base and the midlength of the tergite. Colour uniform medium to dark brown, the gaster usually darker in shade than the head and alitrunk.

M. opacum is characterized by its dense, sharply defined reticulate-punctate sculpture, sparse pilosity and dark colour. It is most closely related to *subdentatum* from which it is only weakly separated (see below), and to *micropacum* which has about 10 pairs of hairs on the first gastral tergite and is noticeably smaller (HW 0·48, SL 0·50–0·51, PW 0·33–0·34).

Material examined

Uganda: Mbarara (*R. M. C. Williams*). **Zambia**: Mumbwa (*Dollman*); Mwengwa (*Dollman*). **Zaire**: Shaba, Shinsenda (*Bequaert*). **Angola**: Kanfuchi (*T. D. A. Cockerell*). **Zimbabwe**: Lupone (*G. Arnold*); Khami (*G. Arnold*); Nantwich (*G. Arnold*); Matopo Hills (*W. L. Brown*).

Monomorium ophthalmicum Forel

Monomorium ophthalmicum Forel, 1894*a*: 87. Holotype worker, Ethiopia: 'Südabessinien' (*Ilg*) (MHN) [examined].

Worker. TL 2·3, HL 0·62, HW 0·49, CI 79, SL 0·45, SI 92, PW 0·30, AL 0·68 (measurements of head approximate as holotype worker head is crushed).

Anterior clypeal margin with its prominent median section extremely shallowly concave centrally. Dorsum of head crushed but sides apparently evenly shallowly convex and converging behind the eyes. Eyes large, the maximum diameter 0·35 × HW and with 10 ommatidia in the longest row. Promesonotum in profile shallowly convex, the highest point approximately at the midlength. Extreme posterior portion of mesonotal outline sharply downcurved to the metanotal groove but the latter not impressed. Propodeal dorsum extremely feebly concave, almost flat in outline. In dorsal view the posterior half of the propodeal dorsum very shallowly transversely concave. Petiole node in profile narrowly but bluntly subconical. Dorsum of head with very faint reticular patterning only, which becomes more distinct towards the

occipital margin. Pronotal dorsum and sides finely reticulate-shagreenate, the mesonotal dorsum similarly but more strongly sculptured. Propodeal dorsum and sides of alitrunk behind the pronotum densely finely reticulate to reticulate-punctate. First gastral tergite very finely shagreenate at extreme base, this fading out posteriorly to fine superficial reticular patterning. Dorsum of head without standing hairs behind the level of the frontal lobes. Dorsal alitrunk without standing hairs. Petiole and postpetiole each with a single pair of backward directed hairs. First gastral tergite with a single pair of elongate hairs, situated approximately at the midlength. Colour uniform medium brown, the legs and antennae dull yellow.

Known only from the damaged holotype, this Ethiopian species appears to belong to the *subopacum*-complex. In the key it runs out close to the southern African species *kitectum* and *willowmorense* but has different critical dimensions, as follows.

	HW	SI	eye
willowmorense	0·50–0·60	88–93	0·24–0·26 × HW
ophthalmicum	0·49	92	0·35 × HW
kitectum	0·43–0·45	100–102	0·29–0·31 × HW

Apart from this *willowmorense* workers have 2–3 pairs of hairs on the first gastral tergite in front of the apical transverse row, whereas *kitectum* and *ophthalmicum* have only a single pair; and *ophthalmicum* shows 10 ommatidia in the longest ocular row, a count only equalled by the largest workers of *willowmorense*.

Material examined

Ethiopia: 'Südabessinien' (*Ilg*).

Monomorium orangiae Arnold

Monomorium (Xeromyrmex) orangiae Arnold, 1956: 67, figs 16, 16a. Paratype workers, South Africa: Orange River, Kakamas, 3.xii.1953 (*R. H. N. Smithers*) (BMNH) [examined].

Worker. TL 3·7–4·0, HL 0·92–0·98, HW 0·76–0·80, CI 81–83, SL 0·78–0·79, SI 98–102, PW 0·44–0·48, AL 1·02–1·06 (3 measured).

Anterior margin of median portion of clypeus broadly and evenly concave. With the head in full-face view the sides evenly convex, broadest at the midlength and converging anteriorly and posteriorly. Maximum diameter of eye 0·21–0·22 × HW and with 10–12 ommatidia in the longest row, the eyes appearing small on the sides of the relatively massive broad head. Outline of promesonotum in profile shallowly convex, the mesonotum sloping posteriorly to the distinctly impressed metanotal groove. Propodeum flat to shallowly transversely concave dorsally, the dorsum separated from the sides by conspicuous narrowly rounded margins. Petiole node cuneate in profile, narrowly rounded dorsally. In dorsal view both nodes narrow and strongly transverse, much broader than long. Cephalic dorsum with 2–3 pairs of hairs straddling the midline behind the level of the frontal lobes; without hairs close to the occipital corners. Dorsal alitrunk without standing hairs. Petiole with one pair and postpetiole with 1–2 pairs of backward directed hairs. First gastral tergite with 2–3 pairs of hairs in front of the apical transverse row. Head smooth, unsculptured except for vestigial superficial reticular patterning; promesonotal dorsum similarly sculptured. Propodeal dorsum with very feeble reticulate-shagreenate sculpture or only vestigially shagreenate. Node of postpetiole unsculptured dorsally, the first gastral tergite unsculptured or with fine superficial reticular patterning. Colour uniform glossy dark brown.

Very close to *tchelichofi*, *orangiae* is separated by its feebler alitrunk sculpture, unsculptured postpetiole node and more sharply defined lateral propodeal margins.

Material examined

South Africa: Orange River, Kakamas (*R. H. N. Smithers*).

Monomorium osiridis Santschi

Monomorium osiridis Santschi, 1915: 258, fig. 7. Holotype worker, Kenya: Bura, 1050 m, iii.1912, st. no. 61 (*Alluaud & Jeannel*) (NMB) [examined].

Worker. TL 1·7–1·9, HL 0·46–0·48, HW 0·34–0·38, CI 74–79, SL 0·32–0·34, SI 90–94, PW 0·22–0·24, AL 0·46–0·50 (6 measured).

Anterior margin of median portion of clypeus shallowly concave. With head in full-face view the eyes distinctly in front of the midlength of the sides and the antennal scapes, when laid straight back, failing to reach the occipital margin. Maximum diameter of eye 0·21–0·24 × HW and with 6–7 ommatidia in the longest row. Sides of head very shallowly convex and weakly convergent posteriorly behind the level of the eyes. Ocipital margin very shallowly concave. Metanotal groove represented by a transverse line across the dorsum; in profile the metanotal groove not impressed. Dorsum of head lacking standing hairs. Dorsal alitrunk without standing hairs. Petiole and postpetiole without backward directed hairs. First gastral tergite without hairs, lacking even the apical transverse row. Apical transverse row of hairs present on the second and third gastral tergites. Mandibular sculpture very feeble, effaced on the apical half of each blade. Cephalic dorsum finely shagreenate between inconspicuous shallow pits. A mid-dorsal longitudinal strip, leading back from the clypeus, is unsculptured and shining. Dorsal alitrunk reticulate-shagreenate anteriorly, the sculpture bcoming stronger posteriorly on the promesonotum; propodeal dorsum finely reticulate-punctate. Sides of alitrunk finely reticulate to weakly reticulate-punctate, with a smooth patch low down on the side of the pronotum. Petiole and postpetiole finely reticulate to granulate. First gastral tergite very weakly shagreenate basally, but this fades out posteriorly leaving the sclerite smooth and shining. Colour uniform dull yellow.

This small species is closely related to *zulu* and *rabirium* from southern Africa but tends to have slightly smaller eyes and is more strongly sculptured on the head. The fine but dense shagreenate sculpture seen on the head of *osiridis* contrasts strongly with the almost unsculptured appearance of *zulu* and *rabirium*, where the head retains only the faintest vestiges of superficial reticular patterning, or is smooth. Otherwise they are very similar, sharing the characters of very reduced pilosity, anteriorly shifted eyes and a lower palp formula (PF 1,2) than is usual in the *salomonis*-group (PF 2,2).

MATERIAL EXAMINED

Kenya: Bura (*Alluaud & Jeannel*); Tana Riv., Kora (*Collins & Ritchie*).

Monomorium parvinode Forel **stat. n.**

Monomorium salomonis var. *parvinode* Forel, 1894*a*: 88. Holotype worker, ETHIOPIA: Südabessinien' (*Ilg*) (MHN) [examined].

WORKER. TL 2·2, HL 0·60, HW 0·47, CI 78, SL 0·44, SI 94, PW 0·30, AL 0·68.

Median portion of anterior clypeal margin more or less transverse. Sides of head very weakly convex and feebly convergent behind the eyes. Maximum diameter of eye 0·30 × HW and with 10 ommatidia in the longest row. Metanotal groove feebly impressed. Dorsum of head with 2 pairs of standing hairs behind the level of the frontal lobes, the first situated just behind the level of the eyes and the second at the occipital margin. Dorsal alitrunk without standing hairs. Petiole node with one pair, and postpetiole with two pairs of backward directed hairs. First gastral tergite with several pairs of standing hairs on the basal half, the apical half of the sclerite hairless except for the apical transverse row. Cephalic dorsum opaque, blanketed by fine dense sculpture which is reticulate-shagreenate to punctulate-shagreenate; the mid-dorsal area with minute and very fine longitudinal patterning so that the entire head has a silky appearance. Dorsal alitrunk finely and densely reticulate to reticulate-punctate. First gastral tergite finely shagreenate, the shagreening feebler apically than basally. Head and alitrunk medium yellowish brown, the gaster much darker brown.

Only known from the holotype worker from southern Ethiopia, a short series from Sudan, and two workers from Harar, Ethiopia, which are tentatively associated here, *parvinode* appears closely related to the Ethiopian *carbo*, the Senegalese *dakarense*, and the southern African species *opacior* and *minor*, all of which share the same very characteristic cephalic sculpture and similar arrangement of standing pilosity.

The Sudan material noted below matches the holotype well in most respects but has a somewhat larger petiole node and smaller eyes. Similarly, the two workers from Harar (MCZ) match the Sudanese specimens and show the same differences from the holotype.

Given the paucity of material I have decided to include these short series under *parvinode* until some idea of variation in these characters can be ascertained.

MATERIAL EXAMINED

Ethiopia: 'Südabessinien' (*Ilg*); Harar (*Ilg*). **Sudan**: Blue Nile, near Hilaliya (*C. Sweeney*).

Monomorium personatum Santschi **stat. n.**

Monomorium (Xeromyrmex) bicolor st. *personatum* Santschi, 1937: 220, fig. 29. Syntype workers, Angola: Kâmba, 1932–33, no. 122 (*A. Monard*) (NMB) [examined].

Monomorium (Xeromyrmex) bicolor st. *personatum* var. *bimaculatum* Santschi, 1937: 221. Syntype workers, Angola: Mupa, 1932–33, no. 132 (*A. Monard*) (NMB) [examined]. [Unavailable name.]

Monomorium bicolor st. *personatum* var. *bimaculatoides* Ettershank, 1966: 87. [Unnecessary replacement name for *bimaculatum* Santschi; unavailable name.]

Worker. TL 3·0–3·5, HL 0·72–0·78, HW 0·52–0·58, CI 72–76, SL 0·58–0·66, SI 109–114, PW 0·37–0·42, AL 0·88–0·98 (7 measured).

Basal (fourth) tooth of mandible only slightly smaller than the third tooth. Eyes relatively large, maximum diameter 0·31–0·33 × HW and with 10–11 ommatidia in the longest row. Head, alitrunk, petiole and postpetiole reticulate-punctate. First gastral tergite reticulate to shagreenate basally. With head in full-face view the sides lacking projecting hairs. Dorsal alitrunk without standing hairs; petiole with a single pair of hairs; postpetiole with two pairs. First gastral tergite with numerous standing hairs which are evenly distributed over the sclerite in front of the apical transverse row. Colour orange with blackish brown gaster, the two strongly contrasting. Base of first gastral tergite with a pair of yellow-orange spots of vaying size, one spot on each side of the midline.

M. personatum is distinguished from all other members of the *bicolor*-complex by its relatively large eyes, the maximum diameter of 0·31–0·33 × HW contrasting with the combined range of 0·19–0·27 × HW shown in the remainder of the complex (*bicolor*, *dictator*, *hirsutum*, *rufulum*, *westi*).

The dense gastral pilosity shown by *personatum*, as well as its large eyes, differentiates it from *bicolor*, the species with which it was originally associated as a subspecies.

Material examined

Angola: Kâmba (*A. Monard*); Mupa (*A. Monard*).

Monomorium pharaonis (L.)

(Figs 24, 56, 60)

Formica pharaonis L., 1758: 580. Syntype workers, Egypt (EUU) [not seen].

Formica antiguensis F., 1793: 357. Material not specified, West Indies: Antigua I. [not seen]. [Synonymy by Roger, 1862*b*: 294; Mayr, 1862: 752.]

Myrmica domestica Shuckard, 1838: 627. Syntype workers, female, Great Britain: London (*Bostock*) (no types known to exist). [Synonymy by Roger, 1862*b*: 294; Mayr, 1862: 752.] (See note 1, below.)

Atta minuta Jerdon, 1851: 105. Syntype workers, India (no types known to exist). [Synonymy by Emery, 1892: 165.]

Myrmica vastator Smith, 1857: 71. Syntype workers, Singapore (*Wallace*) (UM) [examined]. [Synonymy by Donisthorpe, 1932:449.] (See note 2, below.)

Myrmica fragilis Smith, 1858: 124. Syntype workers, Singapore (*Wallace*) (BMNH) [examined]. [Synonymy by Mayr, 1886: 359.]

Myrmica contigua Smith, 1858: 125. Holotype female, Sri Lanka (BMNH) [examined]. [Synonymy by Mayr, 1886: 359.]

Monomorium pharaonis (L.) Mayr, 1862: 752.

Note 1. '*Myrmica unifasciata* Bostock, 1839.' This name appears as a junior synonym of *pharaonis* in the catalogues of Dalla Torre (1893), Wheeler (1922), and Emery (1922), but is not found in earlier indexes such as Mayr (1863) and Roger (1863*b*). The reference given in the later catalogues to Bostock, 1839 [*recte* 1838], is merely Bostock's account of ants invading his home; the offending species is not named in the short article. However, later in the same volume, under Journal of Proceedings (pp. li-lii), and in Shuckard (1838), it becomes apparent that Shuckard had seen Bostock's nuisance species and had initially suggested that it may be *Myrmica unifasciata* Latreille (a species now in *Leptothorax*), but had later changed his mind and decided that the species in question was undescribed. He went on to describe them as *Myrmica domestica* Shuckard (1838). Thus there is not, and never has been, a *Myrmica unifasciata* Bostock, and the entries listed in the catalogues mentioned above are in error.

Note 2. *Myrmica vastator* Smith was wrongly synonymized with *M. destructor* by Forel (1894*a*: 86), probably because he had seen some old *destructor* specimens in the BMNH collection which are

misidentified as *vastator* by Smith. The syntypes of *vastator* which are housed at UM are junior synonyms of *pharaonis*, as Donisthorpe (1932) correctly pointed out.

WORKER. TL 2·2–2·4, HL 0·52–0·62, HW 0·40–0·48, CI 73–80, SL 0·44–0·52, SI 105–117, PW 0·26–0·30, AL 0·60–0·68 (50 measured).

Mandibles weakly longitudinally rugulose, the rugular area frequently overlaid by a fine shagreening; sculpture usually absent on the apical portion of the mandibles close to the teeth, on the portion of the blade which is overlapped by the opposite mandible at full closure. Median portion of clypeus with its anterior margin shallowly concave. In full-face view the sides of the head evenly but very shallowly convex, the occipital margin shallowly convex to approximately transverse. Eyes relatively small, the maximum diameter 0·18–0·21 × HW and with 5–7 (usually 6) ommatidia in the longest row; the eyes situated just in front of the midlength of the sides of the head. Promesonotum convex in profile. Posteriormost portion of the mesonotum sloping steeply to the metanotal groove, much more steeply sloping than the anterior portion. Metanotal groove impressed. Dorsum of head with 3–4 pairs of standing hairs straddling the midline behind the level of the frontal lobes. Occipital margin with another, more laterally placed, pair of hairs which are close to the curve of the occipital corner. Pronotum dorsally with a single pair of standing hairs, situated at the humeri. Mesonotum with a single pair of anteriorly situated standing hairs; very rarely with a second shorter pair situated farther back on the mesonotum. Propodeal dorsum usually hairless but sometimes with a single short pair present at about the midlength. Petiole node with 1–2 pairs, postpetiole with 2–3 pairs of backward directed hairs. First gastral tergite with numerous hairs which are more or less evenly distributed over the sclerite in front of the apical transverse row. Dorsum of head and entirety of alitrunk finely and densely reticulate-punctate, the punctures sometimes slightly reduced on the head, pronotum, or both, so that the area appears finely reticulate rather than reticulate-punctate. Mid-dorsum of head, at about the level of the eyes, sometimes with a feebly shagreenate patch. First gastral tergite with vestigial traces of superficial reticular patterning only, in some the sclerite featureless. Colour uniform pale yellow to light yellowish brown, sometimes with a weak reddish tint. Sides and posterior margin of first gastral tergite, and remaining tergites, usually darker than the disk of the first tergite.

One of the world's best known, most widely distributed and most successful tramp-species, not only in the genus *Monomorium* but in the family Formicidae as a whole, *pharaonis* has been recorded as a major domestic pest for well over a century. Records as early as Bostock (1838) and Jerdon (1851) indicate its remarkable house-infesting propensities and its peculiar ability to nest in any available small cavity once inside a dwelling.

The past few decades have seen an incredible increase in the range and population density of this species in the temperate zones of the world, corresponding to a large extent with the spread of high-density apartment blocks and central heating systems; the species can persist outdoors only under exceptional circumstances outside the tropics (Kohn & Vlček, 1986). A direct result of the ant so thrusting itself into the public notice has been a welter of papers investigating all aspects of its life-history, behaviour and control. It is impractical to present a full bibliography here, but all salient features of studies on *pharaonis* can be obtained from the following short bibliography, and the further references included in the publications cited.

Earlier literature is summarized in Wheeler (1922), Smith (1934), and Peacock *et al.* (1950); the exhaustive list given in Krombein *et al.* (1979) should also be consulted. Introductory and general information is given in Sudd (1967), Wilson (1971) and Dumpert (1978). More specialized aspects of studies on *pharaonis* can be obtained from the following.

Mass rearing and laboratory culture of colonies: Kretzschmar (1971); Buschinger & Petersen (1971); Berndt & Kremer (1980); Samsinak *et al.* (1984).

Control techniques: Eichler & Kleinsorge (1973); Berndt & Nitschmann (1977); Rupes *et al.* (1983).

Summary of pheromone studies: Czechowski (1979).

Aspects of biology and ethology: Lauterer (1971); Petersen & Buschinger (1971*a*, 1971*b*); Beatson (1972); Eichler & Kleinsorge (1972); Hölldobler (1973); Petersen-Braun (1977, 1982); Berndt & Nitschmann (1979).

An interesting series of papers describing the establishment, distribution, biology and attempted eradication of *pharaonis* in Poland is given in Wiśniewski *et al.* (1971); Czajkowska (1979); Krzeminska *et al.* (1979). Distribution on a world-wide basis is indicated by the following. North America: Krombein *et al.* (1979). South America: Kempf (1972). Africa: Wheeler (1922). Pacific Islands: Wilson & Taylor (1967).

For comments on the relatives and place of origin of *pharaonis* see the notes on the *pharaonis*-complex in the introduction to the *salomonis*-group.

MATERIAL EXAMINED

Afrotropical region. **Ghana**: Kibi (*D. Leston*); Mole Game Res. (*J. C. Greig*); Aburi (*P. Room*); Tafo (*A. H. Strickland*). **Nigeria**: Ibadan (*A. Russel-Smith*); Gambari (*B. Bolton*); Ile-Ife (*J. T. Medler*). **Cameroun**: Nkoemvon (*D. Jackson*); Victoria (*B. Malkin*). **Sudan**: Juba to Khartoum (*H. W. Bedford*). **Kenya**: Kabete (*H. E. Box*). **Tanzania**: Dar es Salaam (*D. Griffiths*); Zanzibar (*E. S. Brown*). **Zimbabwe**: Bulawayo (*G. Arnold*). **Mozambique**: Beira (*G. Arnold*). **Angola**: Benguela.

Other regions. **India**: Calicut (*A. P. Rosy*). **Sri Lanka**: Mihintale (*Stubbs & Chandler*); Bibile (*R. Winney*); no loc. (*T. B. Fletcher*). **Thailand**: Nong Hoi (*D. Jackson*). **Philippines**: Leyte, Visca (*C. K. Starr*). **Singapore**: (*A. R. Wallace*). **East Malaysia**: Sarawak, Long Pala (*V. Eastop*); Sabah, Gn. Silam (*R. Leakey*); Tawau Quoin (*M. J. Way*). **Indonesia**: Sulawesi, nr Morowali (*M. Brendell*); Minahassa (*A. H. G. Alston*); Java, Bogor (*A. H. G. Alston*); Irian Jaya, Vogelkopf (*L. E. Cheesman*); Cyclops Mts (*L. E. Cheesman*). **Papua New Guinea**: Lae (*R. W. Paine*). **Solomon Is**: Guadalcanal (*R. A. Lever*); Guadalcanal (*E. S. Brown*); Three Sisters (*R. A. Lever*). **New Hebrides**: Malekula (*L. E. Cheesman*). **Fiji Is**: Suva (*R. A. Lever*). **Australia**: Darwin (*G. F. Hill*); Qld., Bundaberg (*R. C. L. Perkins*); Redlynch. **Guiana**: Blairmont (*H. E. Box*). **Trinidad** (no data). **Mexico**: Acapulco (*Hoge*). **Greece**: Crete (*D. M. A. Bate*); Salonika (*J. Waterston*). **Great Britain**: London (series by *J. C. Deeming*, *N. V. Barton*, *B. Bolton*, *T. Smith*, *R. N. Hedges*, *K. Guichard*, *E. R. Goodliffe*); Surrey, Coulsdon; Berkshire, Reading; Essex, Clacton (*D. Harwood*); Sussex, East Grinstead (*P. B. Cornwell*); Devon, Exeter (*F. R. Rowley*); Norfolk, Norwich (*Corran*); Yorkshire, Leeds (*J. Curtis*).

Monomorium rabirium sp. n.

HOLOTYPE WORKER. TL 1·7, HL 0·44, HW 0·33, CI 75, SL 0·32, SI 97, PW 0·22, AL 0·44.

Anterior margin of median portion of clypeus approximately transverse, indented medially. With the head in full-face view the eyes conspicuously in front of the midlength of the sides. Antennal scapes when laid straight back from their insertions not reaching the occipital margin. Maximum diameter of eye 0·27 × HW and with 7 ommatidia in the longest row. Sides of head shallowly convex, weakly converging posteriorly behind the level of the eyes. Occipital margin broadly and extremely shallowly concave. Promesonotal dorsum feebly convex in profile, sloping shallowly behind to the very weakly impressed metanotal groove. Dorsum of head without standing hairs behind the level of the frontal lobes. Alitrunk, petiole and postpetiole without hairs. First gastral tergite without standing hairs, even the apical transverse row of hairs which is almost universal in the *salomonis*-group is absent here. (Apical transverse rows of standing hairs are present on the second and third tergites.) Mandibular sculpture very feeble. Dorsum of head sculptured only with the last faint vestiges of superficial reticular patterning, almost entirely effaced. Pronotal dorsum faintly reticulate to feebly shagreenate, the mesonotum more obviously shagreenate and the propodeal dorsum finely reticulate-shagreenate. First gastral tergite faintly superficially shagreenate to smooth. Colour pale brownish yellow.

PARATYPE WORKERS. TL 1·7, HL 0·45–0·48, HW 0·34–0·36, CI 75–77, SL 0·32–0·34, SI 92–97, PW 0·22–0·23, AL 0·46–0.48 (6 measured). Maximum diameter of eye 0·26–0·28 × HW and with 7–8 ommatidia in the longest row. Otherwise as holotype.

Holotype worker, **Botswana**: Okavango Delta, Maxwee, grassland, sample no. 26, 10.x.1975 (*A. Russell-Smith*) (BMNH).

Paratypes. 7 workers with same data as holotype (BMNH; MCZ).

Non-paratypic material examined. **Botswana**: Maxwee (*A. Russell-Smith*).

One of the smallest members of the *salomonis*-group and one of the most reduced, in terms of pilosity and sculpture. *M. rabirium* is characterized by the absence of dorsal pilosity, very faint sculpture, anterior shifting of the eyes, light colour and small size. The position of the eyes in this species is reminiscent of the *setuliferum*-group, but the basal tooth of the mandible is not markedly reduced in size, the scapes are longer than is seen in *setuliferum* and its allies, and the head in *rabirium* is narrower. As the eyes in *esharre*, a close relative, are slightly in front of the midlength it seems reasonable to assume that these two species are convergent upon the condition seen in the *setuliferum*-group as regards the eyes, whilst showing other diagnostic characters referring them to the *salomonis*-group.

Mandibular sculpture in *rabirium* is much fainter than in other *salomonis*-group members, and for this reason the species runs out twice in the key, once with the members of the *salomonis*-group and *setigerum*-group where the mandibles are usually conspicuously sculptured, and once elsewhere among species where they are smooth.

The closest relatives of *rabirium* are *zulu* and *osiridis* (*mediocre*-complex) which share the lack of pilosity and anteriorly shifted eyes. Also these species appear to have a palp formula of 1,2 (based in each case on an *in situ* count), lower than the usual PF 2,2 seen elsewhere in the group. *M. osiridis*, from Kenya, separates from *rabirium* by having the head conspicuously sculptured. For differentiation of *rabirium* and *zulu* see under the latter.

Monomorium rufulum Stitz **stat. n.**

(Figs 27, 36, 42)

Monomorium salomonis var. *rufula* Stitz, 1923: 156. Syntype workers, NAMIBIA: Windhoek, v.1911 (*Michaelsen*); Omaruru, 21–22.v.1911 (*Michaelsen*) (MNHU) [examined].
Monomorium (Xeromyrmex) monardi Santschi, 1937: 224, figs 15, 16. Holotype worker, ANGOLA: Osi, 1932–33, no. 16 (*A. Monard*) (NMB) [examined]. **Syn. n.**

WORKER. TL 3·0–3·6, HL 0·76–0·88, HW 0·59–0·70, CI 75–80, SL 0·69–0·81, SI 112–120, PW 0·40–0·47, AL 0·98–1·16 (15 measured).

Fourth (basal) tooth of mandible reduced to a minute denticle which is only a fraction the size of the third tooth. Ventral surface of head with numerous very long anteriorly curved J-shaped or strongly arcuate hairs. Maximum diameter of eye 0·23–0·26 × HW, with 10–12 ommatidia in the longest row. Median portion of clypeus with its anterior margin transverse to shallowly convex in full-face view. Dorsum of head with a maximum of 3 pairs of hairs behind the level of the frontal lobes, but in full-face view the sides and occipital margin without projecting hairs. Dorsal alitrunk usually hairless but in Namibian specimens the pronotal humeri with a single hair on each side. Petiole node with 1–2 and postpetiole with 2–3 pairs of posteriorly projecting hairs. First gastral tergite densely pilose, with about 10 pairs in front of the apical transverse row. Colour dull orange to reddish orange on head, alitrunk, petiole and postpetiole; the gaster darker brown to blackish brown but frequently with a much paler spot or streak anteromedially. Dorsum and sides of head and entirety of alitrunk densely reticulate-punctate, the punctures small, crowded and sharply defined. Petiole and postpetiole reticulate-punctulate, the punctulae less well defined than on the alitrunk. Gaster feebly shagreened basally, the sculpture fading apically.

A distinctive and quite widespread member of the *bicolor*-complex in southern Africa, *rufulum* is immediately diagnosed by its reduced basal mandibular tooth, numerous long arched ammochaete hairs on the ventral surface of the head, and densely hairy first gastral tergite contrasting to the hairless (or nearly hairless) dorsal alitrunk. According to Arnold (1916) this species, which he wrongly gives as *nitidiventre*, is very agile and nests in loose sandy soil. Both alate and apterous females of *rufulum* are known.

MATERIAL EXAMINED

Angola: Osi (*A. Monard*). **Namibia**: Windhoek (*Michaelsen*); Namib Desert (*A. C. Marsh*). **Botswana**: Maxwee (*A. Russell-Smith*). **Zimbabwe**: Bulawayo (*G. Arnold*); Bembesi (*G. Arnold*).

Monomorium senegalense Roger nomen dubium

Monomorium senegalense Roger, 1862*b*: 294. Syntype workers, SENEGAL (not in MNHU, presumed lost).

From the short original description of this species it certainly belongs in the *salomonis*-group, and is very probably a member of the *australe*-complex. Unfortunately nothing more definite can be said unless the type-series is rediscovered. It is interesting to note that in this complex *dakarense* and *senegalense* are the only members recorded from West Africa, and it is possible that *senegalense* may be a senior synonym of *dakarense*.

Monomorium subdentatum Forel

Monomorium subdentatum Forel, 1913*a*: 332. Syntype workers, ZAIRE: Katanga, Elisabethville, 23.iv.1912 (*Bequaert*) (MHN; MRAC) [examined].

WORKER. TL 3·1–3·3, HL 0·80, HW 0·63–0·66, CI 79–83, SL 0·66–0·68, SI 103–105, PW 0·42, AL 0·94–0·98 (2 measured).

Answering the description of *opacum* but differing as follows.

subdentatum
In profile propodeal dorsum and declivity meeting in a sharply defined or subdentate angle.
SI 103–105.
Anterior free margin of median portion of clypeus concave.

opacum
In profile propodeal dorsum and declivity rounding together, not meeting in a sharp angle.
SI 90–100.
Anterior free margin of median portion of clypeus convex.

Known only from a couple of syntypes and a short series from Kienge, Zaire, *subdentatum* is only feebly separated from *opacum*. Further collections may well provide intermediates in the characters mentioned above. The series from Kienge (in MCZ) differs from the syntypes as the alitrunk of the worker has a few minute standing hairs on the promesonotum and a quite densely hairy first gastral tergite. Whether this series represents a separate species, or whether the syntypes of *subdentatum* have been badly abraded, remains to be decided.

MATERIAL EXAMINED
Zaire: Shaba, Lubumbashi (*Bequaert*); Kienge (*Ross & Leech*).

Monomorium subopacum (Smith)

Myrmica subopaca Smith, 1858: 127. Syntype workers, females, MADEIRA (*T. V. Wollaston*) (BMNH) [examined].
Myrmica glyciphila Smith, 1858: 125. Syntype workers, SRI LANKA (BMNH) [examined]. **Syn. n.** [Rejected as prior name based on pagination, on the first reviser principle.]
Monomorium mediterraneum Mayr, 1891: 72. Syntype workers, female, SPAIN (NMV) [not seen]. [Synonymy by Mayr, 1862: 753.]
Monomorium subopacum (Smith) Mayr, 1862: 753.
Monomorium salomonis st. *subopacum* var. *senegalensis* Santschi, 1913*a*: 306. Syntype workers, SENEGAL: Saint-Louis (*Claveau*) (NMB) [examined]. [Unavailable name.]
Paraphacota surcoufi Santschi, 1919*a*: 90, fig. 1. Syntype males, ALGERIA: Biskra, viii.1917, at light (*J. Surcouf*) (NMB) [examined]. **Syn. n.**
Paraphacota cabrerai Santschi, 1919*c*: 405, fig. 1. Holotype male, CANARY IS: Teneriffe, Laguna, 25.vii. 1918 (*A. Cabrera y Diaz*) (NMB) [examined]. **Syn. n.**
Monomorium (Xeromyrmex) salomonis st. *subopacum* var. *liberta* Santschi, 1921*a*: 170. Syntype workers, SENEGAL: Saint-Louis (*Claveau*) (NMB) [examined]. [Syntypes of *liberta* are same specimens as *senegalensis* above. Unavailable name.]
Paraphacota cabrerae [sic] st. *obscuripes* Santschi, 1921*c*: 424. Syntype males, CANARY IS: Teneriffe, Bejairo, 20.ix.1898 (*Cabrera*); Bejamar, 10.x.1909 (*Cabrera*) (NMB) [examined]. [Synonymy by Santschi, 1927: 241.]
Monomorium (Xeromyrmex) salomonis subsp. *subopaca* var. *claveaui* Emery, 1922: 178. [Unnecessary replacement name for *senegalensis* Santschi. Unavailable name.]
Monomorium (Xeromyrmex) salomonis subsp. *subopacum* var. *santschiellum* Wheeler, 1922: 872. [Unnecessary replacement name for *senegalensis* Santschi. Unavailable name.]
Monomorium (Xeromyrmex) subopacum subsp. *italica* Baroni Urbani, 1964*b*: 154, figs 2,3. Holotype worker, ITALY: Gambarie (Aspromonte), viii.1957 (*C. Conci*) (MCSNV) [not seen]. [Synonymy by Baroni Urbani, 1968*b*: 450.]

WORKER. TL 3·1–3·4, HL 0·70–0·82, HW 0·54–0·64, CI 76–79, SL 0·58–0·68, SI 102–110, PW 0·36–0·42, AL 0·88–1·00 (15 measured).

Anterior free margin of median portion of clypeus indented or concave at its midpoint. Maximum diameter of eye 0·27–0·30 × HW, with 9–11 ommatidia in the longest row. With the alitrunk in profile the mesonotum sloping evenly back to the metanotal groove, the latter only very slightly impressed. Dorsum of head in profile without standing hairs behind the level of the frontal lobes or, very rarely indeed, with a single pair situated just behind the level of the posterior margin of the eye. Dorsal alitrunk without standing hairs. Petiole and postpetiole each with a single pair of backward directed hairs or rarely the postpetiole with two pairs. First gastral tergite with an apical transverse row of hairs and also with a single pair situated at or close to the midlength. Exceptionally a second pair may occur between the pair at the midlength and the gastral base. Dorsum of head reticulate-granulate to shagreenate-punctulate, the sculpture blanketing the surface. Usually the mid-dorsal longitudinal strip of the cephalic sculpture with a smeared appearance or even with a longitudinally oriented sculptural pattern; the constituents of the sculpture not as sharply

defined as on the sides above the eyes. Promesonotal dorsum sculptured much as the head on its anterior portion, but posteriorly becoming more plainly reticulate or even reticulate-punctate. Propodeal dorsum reticulate to reticulate-punctate. First gastral tergite with superficial patterning only, which is usually denser basally than apically. Colour brown, varying in shade but usually with the gaster darker than the head and alitrunk.

This species is widely distributed in Africa north of the Sahara, ranging from Morocco in the west to Egypt in the east, and also occurring in the drier parts of the states bordering the northern and eastern shores of the Mediterranean. It is well established on most islands in the Mediterranean Sea and is present on Madeira, the Cape Verde Islands, the Canary Islands, and Ascension Island. It seems probable that the species may be widely distributed in the Sahelian zone of Africa but to the present I have seen only the single sample from Niger, noted below. Three short series examined, one from South Africa, one from Sri Lanka and one from Madagascar, certainly represent casual introductions by man in historic times as they are well away from the normal range of this species. Previous notes on distribution of this species in sub-Saharan Africa given in Wheeler (1922) and elsewhere should be treated with great caution as misidentifications of specimens were rife in the *salomonis*-group.

MATERIAL EXAMINED

Afrotropical region. **Niger**: Niamey (*P. Room*). **Senegal**: Saint-Louis (*Claveau*). **South Africa**: Durban (*C. P. van der Merve*).

Other regions. **Madagascar**: Maevantanara (*J. M. Wilson*). **Sri Lanka**: no loc. (ex coll. Smith). **Madeira**: (*T. V. Wollaston*); Porto Santo (*N. L. H. Krauss*); Porto Santo (*Lindberg*). **Cape Verde Is**: many small samples (*Lindberg*). **Ascension I.** (*E. A. G. Duffey*). **Gibraltar** (*J. J. Walker*). **Sardinia** (*E. Saunders*). **Morocco**: Tiferhial, nr Tiznit (*Meinander*). **Israel**: Sea of Galilee (*J. Palmoni*); Jordan Valley, Dagania A (*J. Palmoni*). **Egypt**: Siwa (*J. Omer-Cooper*); Neviot, E. Sinai (*C. R. Vardy*).

Monomorium sutu sp. n.

HOLOTYPE WORKER. TL 2·9, HL 0·73, HW 0·56, CI 77, SL 0·58, SI 104, PW 0·40, AL 0·94.

Median portion of clypeus with anterior free margin transverse to shallowly convex. Head in full-face view with sides evenly weakly convex, broadest at the level of the eyes; the sides more obviously convergent behind than in front of the eyes. Occipital margin broadly but shallowly concave. Eyes relatively large, the maximum diameter 0·36 × HW and with 12 ommatidia in the longest row. Eyes situated at the midlength of the sides in full-face view and distinctly larger than in any other member of the *australe*-complex. Promesonotal dorsum in profile sloping shallowly and evenly posteriorly, the metanotal groove indicated by a weak incised line across the dorsum but not impressed. Petiolar peduncle anteroventrally with a very low flange-like process. Dorsum of head with a single pair of short standing hairs behind the level of the frontal lobes, situated approximately at the level of the posterior margins of the eyes when the head is viewed in profile (in the holotype the left hand hair of this pair is missing). Occipital margin of head and all of dorsal alitrunk without standing hairs. Petiole and postpetiole each with a single pair of backward directed hairs. First gastral tergite with 2 pairs of standing hairs in front of the apical transverse row; one pair situated at about the midlength of the tergite, the second somewhat closer to the base. Dorsum of head opaque, blanketed by fine and dense reticulate-shagreenate to punctate-shagreenate sculpture; mid-dorsally the surface with exceptionally fine dense scratch-like longitudinal sculpture. Dorsal alitrunk finely and densely reticulate to reticulate-punctate. First gastral tergite very densely and finely shagreenate, opaque but dully shining. Head in front of eyes yellowish brown, posteriorly the head becoming darker brown. Sides of head below level of eyes lighter than dorsum. Promesonotum yellowish brown and lighter than head, but propodeum, petiole, postpetiole and gaster much darker, the last very dark brown.

PARATYPE WORKERS. TL 2·7–3·0, HL 0·68–0·75, HW 0·50–0·57, CI 74–79, SL 0·54–0·59, SI 102–108; PW 0·36–0·40, AL 0·84–0·94 (17 measured). As holotype but maximum diameter of eye 0·35–0·38 × HW and with 10–12 ommatidia in the longest row. Pilosity as holotype but some paratypes with only a single pair of hairs on the first gastral tergite (discounting the apical transverse row), this pair situated at the midlength of the sclerite.

Holotype worker, **Kenya**: Tana River, Kora, 0–100 m, 1983, no. 19, *Acacia/Commiphila* scrub (*N. M. Collins & M. Ritchie*) (BMNH).

Paratypes, 17 workers with same data as holotype (BMNH; MHN; MCZ).

The distinctive cephalic sculpture links *sutu* with *opacior* and its immediate allies, but *sutu* is quickly separated from these, and from all other members of the *australe*-complex, by its relatively very large eyes. Range of eye size throughout the remainder of the complex is 0·23–0·30 × HW, as compared to 0·35–0·38 × HW in *sutu*.

Monomorium tchelichofi Forel

Monomorium tchelichofi Forel, 1914: 244. Syntype workers, South africa: Cape Prov., Willowmore (*H. Brauns*) (MHN; MCZ) [examined].

Worker. TL 3·8–4·0, HL 0·90–0·98, HW 0·74–0·82, CI 82–86, SL 0·74–0·80, SI 95–100, PW 0·46–0·52, AL 1·00–1·10 (10 measured).

Anterior margin of median portion of clypeus evenly concave in full-face view. Head relatively short and broad (CI above) with evenly shallowly convex sides. Eyes of moderate size, the maximum diameter 0·20–0·23 × HW and with 10–11 ommatidia in the longest row. Occipital margin indented medially, shallowly concave. Alitrunk in profile with promesonotum evenly convex, highest at junction of pro- and mesonotum, the latter sloping posteriorly to the weakly impressed metanotal groove. Propodeal dorsum shallowly concave transversely, the margins separating dorsum from sides rounded and not sharply defined. Dorsum of head with 3–4 pairs of standing hairs behind the level of the frontal lobes, all pairs straddling the midline and none close to the occipital corners. Dorsal alitrunk hairless. Petiole node with one pair, postpetiole with 2–3 pairs of backward directed hairs. First gastral tergite with short standing hairs sparsely but evenly distributed over the sclerite in front of the apical transverse row. Cephalic dorsum unsculptured except for superficial fine reticulate patterning. Dorsal alitrunk finely reticulate to reticulate-punctulate everywhere, the sculpture generally increasing in density and intensity from front to back. Dorsum of postpetiole with fine granulate to punctulate sculpture. First gastral tergite with fine and usually dense superficial reticulate patterning. Colour dark brown, the gaster usually darker in shade than the alitrunk.

As mentioned under *fridae*, *tchelichofi* may well be a junior synonym of this name. For the present the sparse material of the two allows them to be separated on slight differences in size, but further samples may well annul the presumed differences.

Material examined

South Africa: Cape Prov., Willowmore (*H. Brauns*); Willowmore (*G. Arnold*).

Monomorium termitarium Forel **stat. n.**

Monomorium salomonis subsp. *termitarium* Forel, 1910*c*: 17. Syntype workers, female, Botswana: Kalahari, Kooa (*L. Schultze*) (MHN; BMNH) [examined].

For discussion of this species see under *australe*.

Monomorium vatranum **sp. n.**

(Fig. 55)

Holotype worker. TL 2·8, HL 0·71, HW 0·52, CI 73, SL 0·60, SI 115, PW 0·34, AL 0·80.

Median portion of clypeus with its anterior margin shallowly convex. With the head in full-face view the sides in front of the eyes roughly parallel, behind the eyes weakly converging posteriorly. Occipital margin broadly and very shallowly concave. Maximum diameter of eye 0·27 × HW and with 9 ommatidia in the longest row. Scapes long, SI > 110. Alitrunk in profile with promesonotum low and only very shallowly convex, the metanotal groove not or only vestigially impressed. Dorsum of head with 3 pairs of hairs straddling the midline behind the level of the frontal lobes, without hairs close to the occipital corners. Dorsal alitrunk with a single pair of hairs, situated at the pronotal humeri. Petiole and postpetiole each with a single pair of backward directed hairs. First gastral tergite with hairs sparsely but more or less evenly distributed over the sclerite in front of the apical transverse row. Cephalic dorsum with superficial reticular patterning, which may appear feebly shagreenate close to the occipital margin. Pronotal dorsum finely and densely reticulate, the sculpture becoming more sharply defined posteriorly on the alitrunk so that the propodeum is shallowly reticulate-punctulate. First gastral tergite smooth and shining, with superficial reticulate patterning only. Colour a uniform very dark brown.

PARATYPE WORKERS. TL 2·7–3·0, HL 0·62–0·74, HW 0·45–0·56, CI 72–76, SL 0·53–0·63, SI 113–120, PW 0·34–0·36, AL 0·76–0·82 (12 measured). Maximum diameter of eye 0·27–0·29 × HW, with 9–10 ommatidia in the longest row. As holotype but colour varying from medium brown to blackish brown, the colour usually uniform but sometimes the alitrunk slightly lighter than the head and gaster.

Holotype worker, **Namibia**: Namib Desert, Swartbank 14° 50′ E, 23° 16′ S, sample S8, 15.vii.1981 (*A. C. Marsh*) (BMNH).

Paratypes, 11 workers with same data as holotype; 3 workers, Namib Desert, Ganab, 15° 37′ E, 23° 08′ S, sample 98, sandy plain, 16.viii.1981 (*A. C. Marsh*); 3 workers with same data as last but sample G24, 5.v.1981; 3 workers with same data but sample 187, 19.viii.1981; 1 worker, Namib Desert, Mirabeb, 15° 24′ E, 23° 25′ S, sample M13, 8.iv.1982 (*A.C. Marsh*) (BMNH; MHN; MCZ).

This small darkly coloured species is the *Monomorium* sp. B of Marsh (1984) and belongs to the *viator*-complex.

Monomorium viator Santschi

(Figs 47, 52)

Monomorium (Xeromyrmex) viator Santschi, 1923: 280, fig. 3. Syntype workers, male, NAMIBIA: Namsen, 22.xii.1925 (*R. W. E. Tucker*) (NMB) [examined].

WORKER. TL 3·0–3·7, HL 0·80–0·96, HW 0·58–0·72, CI 73–77, SL 0·68–0·86, SI 111–119, PW 0·38–0·46, AL 0·92–1·12 (15 measured).

Median portion of anterior clypeal margin transverse to shallowly concave. Eyes relatively very large, the maximum diameter 0·37–0·40 × HW, with 13–15 ommatidia in the longest row. Promesonotal dorsum evenly convex and sloping posteriorly to the very feebly impressed metanotal groove, in some workers the groove virtually unimpressed. Propodeal dorsum flat to shallowly transversely concave. Dorsum of head with 2–3 pairs of standing hairs straddling the midline behind the level of the frontal lobes. Dorsal alitrunk without hairs. Petiole with one pair and postpetiole with 1–2 pairs of backward directed hairs. First gastral tergite with hairs present in front of the apical transverse row, relatively few in number but more or less evenly distributed over the sclerite; often with a tendency to be more concentrated on the basal half. Dorsum of head finely and densely reticulate to reticulate-shagreenate. Dorsal alitrunk reticulate to punctulate-granular on the pronotum, the sculpture generally becoming coarser and more conspicuous posteriorly but sometimes more or less even on the entire surface. First gastral tergite glossy and with superficial reticular patterning. Head and gaster usually darker in colour than the alitrunk. Alitrunk varying from yellowish orange to reddish brown, the head and gaster proportionally darker, ranging from light reddish to dark brown, with or without a reddish tint. In some the head may be bicoloured, with the posterior half lighter in shade than the anterior. Clypeus, mandibles and appendages are frequently dull yellow.

A very distinctive and conspicuous species of the Namib Desert, *viator* is rendered easily recognizable by its long scapes and relatively very large eyes, coupled with its lack of standing hairs on the alitrunk.

This is the species referred to by Marsh (1984) as *Monomorium* sp. A in his Namib Desert pitfall studies, and as can be seen from the material examined, appears to be one of the commoner species in the desert areas which he sampled.

MATERIAL EXAMINED

Namibia: Namib Desert, Skeleton Coast (*A. C. Marsh*); Unjab Riv. (*A. C. Marsh*); Samanab Riv. (*A. C. Marsh*); E. Dune Field (*A. C. Marsh*); Tsondab Vlei (*A. C. Marsh*); Ganab (*A. C. Marsh*); Swartbank (*A. C. Marsh*); Namsen (*R. W. E. Tucker*).

Monomorium westi **sp. n.**

(Figs 37, 43)

HOLOTYPE WORKER. TL 3·0, HL 0·78, HW 0·60, CI 77, SL 0·65, SI 108, PW 0·40, AL 0·90.

Fourth (basal) tooth of mandible about the same size as the third tooth, not reduced to a minute denticle. Prominent median portion of clypeus with its anterior free margin strongly concave, the concavity flanked on each side by a sharp projecting tooth. With the head in full-face view the eyes at the midlength of the

sides, maximum diameter of eye 0·23 × HW, with 10 ommatidia in the longest row. Occipital margin of head weakly indented medially, the sides evenly but very shallowly convex, almost straight. Alitrunk in profile with metanotal groove only feebly indicated, not sharply impressed. Propodeal dorsum not sharply marginate laterally, the mid-dorsal longitudinal strip of the propodeum only very weakly indented. Petiolar peduncle with a small anteroventral lobe-like process. Height of petiole node from spiracle to summit greater than the length of the anterior peduncle from spiracle to anteriormost point of the ventral process. Petiole node bluntly conical in profile, distinctly higher than the postpetiole node. In dorsal view both nodes of approximately equal width. Dorsum of head with 1–2 pairs of hairs behind the level of the frontal lobes, without hairs projecting from the sides of the head or from the occipital margin. Ventral surface of head with numerous projecting fine curved hairs and with a very long anteriorly curved pair behind the buccal margin. Dorsal alitrunk without standing hairs. Petiole node with one pair, and postpetiole with 3 pairs of backward directed hairs. First gastral tergite with hairs more or less evenly distributed over the sclerite, with about 7–8 pairs in front of the apical transverse row. First gastral sternite densely hairy. Dorsum and sides of head and all surfaces of alitrunk finely and densely reticulate-punctate, the individual punctures small, densely crowded and sharply defined. Petiole and postpetiole similarly sculptured but the punctures less sharply defined. First gastral tergite finely shagreenate, the sculpture densest basally and becoming more feeble apically. Head, alitrunk, petiole, postpetiole and appendages orange to dull orange, the gaster blackish brown to black, the two colours strongly contrasting.

Paratype workers. TL 3·0–3·2, HL 0·80–0·84, HW 0·60–0·65, CI 73–80, SL 0·64–0·68, SI 105–110, PW 0·40–0·43, AL 0·92–0·96 (6 measured). As holotype but maximum diameter of eye 0·22–0·25 × HW, with 9–10 ommatidia in the longest row. Dorsum of head at most with three pairs of standing hairs behind the level of the frontal lobes; postpetiole with 3–4 pairs of backward directed hairs.

Holotype worker, **Kenya**: Kora, 8.xii.1983, sample AT1 *Acacia tortius* (*C. West*) (BMNH).

Paratypes, 3 workers with same data as holotype; 2 workers with same data but 30.xii.1983, sample AT3 (BMNH; MCZ; MHN).

A distinctive member of the *bicolor*-complex, with strongly developed dense reticulate-punctate sculpture and conspicuously contrasting colour pattern, *westi* is diagnosed by its strongly concave anteromedian clypeal margin which is flanked by a pair of sharp, freely projecting teeth, a character not seen in any other species of the complex.

Apart from this *westi* has much smaller eyes than *personatum* (0·31–0·33 × HW), lacks the reduced basal tooth and ammochaete hairs diagnostic of *rufulum*, lacks the dense alitrunk pilosity seen in *hirsutum*, and has the gaster much more densely hairy than in *bicolor* itself.

The species was discovered by Mr Christopher West of Oxford University whilst sampling the insect fauna of *Acacia* trees. The ants were collected from sheets spread around the bases of trees which had been sprayed with insecticide to bring down the insect fauna. As other members of the *bicolor*-complex are terrestrial rather than arboreal I suspect that the specimens of *westi* had walked onto the sheets after spraying was complete, and were killed by residual insecticide.

Monomorium willowmorense sp. n.

(Fig. 54)

Monomorium salomonis r. *herrero* [sic] var. *willowmorensis* Forel, 1914: 245. Syntype workers, South Africa: Cape Prov., Willowmore (*G. Arnold*) (BMNH; MHN) [examined]. [Unavailable name.]

Monomorium salomonis r. *herrero* [sic] var. *belli* Forel, 1914: 245. Syntype workers, South Africa: Cape Prov., Willowmore (*G. Arnold*) (BMNH; MHN; MCZ) [examined]. [Unavailable name.]

Syntype workers. TL 2·5–3·0, HL 0·62–0·72, HW 0·50–0·60, CI 79–83, SL 0·44–0·54, SI 88–93, PW 0·33–0·39, AL 0·70–0·88 (12 measured).

Anterior free margin of median portion of clypeus shallowly convex to approximately transverse, never concave or sharply indented medially. Eyes of moderate size, the maximum diameter 0·24–0·26 × HW and with 8–10 ommatidia in the longest row. Antennal scapes with SI < 100. With alitrunk in profile the promesonotum more or less evenly shallowly convex, the highest point approximately at the midlength. Metanotal groove shallowly to feebly impressed, generally better marked in larger than in smaller workers. Propodeal dorsum weakly flattened to shallowly concave posteriorly and between the propodeal angles where dorsum meets declivity. Petiole and postpetiole nodes in dorsal view both broader than long, of approximately equal width. Head mid-dorsally smooth and polished, with only the faintest traces of

superficial reticular patterning. Closer to the occipital margin the reticular pattern is denser and more conspicuous, and the patterning is usually more distinct on the sides above the eyes than on the dorsum. Dorsal alitrunk with sculpture becoming stronger from front to back. Pronotum anteriorly finely reticulate, the propodeum finely reticulate-punctate. Petiole and postpetiole nodes weakly reticulate-granular. First gastral tergite superficially reticulate, the pattern usually more distinct basally than apically. All dorsal surfaces of head and body with sparse appressed pubescence but standing hairs very sparse. On the head the dorsum lacks hairs behind the level of the frontal lobes and hairs are entirely absent from the dorsal alitrunk. The petiole has one pair and the postpetiole 2 pairs of backward directed hairs. First gastral tergite with 2–3 pairs of hairs as well as an apical transverse row. Colour medium brown, the gaster usually slightly darker in shade than the alitrunk.

Syntypes, 20 workers, **South Africa**: Cape Prov., Willowmore, i.1914 and 1.i.1914; bearing the numbers 165 or 166 in red ink under the card mount, or with the numbers 208 or 219 in pencil on the upper surface of the card mount (MHN and MCZ material may lack these numbers) (*G. Arnold*) (BMNH; MHN; MCZ).

Non-syntypic material examined. **South Africa**: Cape Prov., Willowmore (*H. Brauns*); Grahamstown (*W. L. Brown*).

This small but fairly distinctive species seems closest related to the even smaller Namibian *kitectum*. Differences separating them are given in the key.

Monomorium zulu Santschi

Monomorium zulu Santschi, 1914*b*: 18. Syntype workers, SOUTH AFRICA: Natal, Zululand, Junction of Umfolozis, 10.vii.1905 (*I. Trägårdh*) (NMB) [examined].

WORKER. TL 1·7–1·8, HL 0·44–0·46, HW 0·34, CI 74–77, SL 0·29–0·30, SI 85–88, PW 0·20–0·22, AL 0·44–0·46 (2 measured).

Very closely related to *rabirium* (*mediocre*-complex) and sharing its diagnostic characters, as given under the description of *rabirium*. The two differ in the following features.

rabirium	*zulu*
Maximum diameter of eye 0·26–0·28 × HW, with 7–8 ommatidia in the longest row.	Maximum diameter of eye 0·24–0·26 × HW, with 5–6 ommatidia in the longest row.
SI 92–97.	SI 85–88.
Cephalic dorsum with traces of superficial reticular patterning close to occipital margin.	Cephalic dorsum smooth with scattered small pits close to occipital margin.
Pronotal dorsum reticulate to shagreenate.	Pronotal dorsum smooth.

Despite these differences I suspect that future collections of these forms made between their respective type-localities in Botswana and South Africa may well show a gradation of one form into the other.

MATERIAL EXAMINED

South Africa: Natal, Zululand (*I. Trägårdh*).

The *setuliferum*-group

(Figs 57–59)

WORKER. Monomorphic but with some size variation in any given series. Palp formula 2,2 (*alamarum*, *setuliferum*). Mandibles usually with 4 teeth, the basal tooth reduced to a small or minute denticle which is offset from the main row of 3 teeth. Basal denticle lost in one species (*havilandi*) leaving the mandible 3-dentate. Mandibles longitudinally striate or rugose (smooth in *xanthognathum*). Median portion of clypeus raised and weakly bicarinate, not strongly projecting forward and the anterior clypeal margin lacking prominent teeth or angles. Posteriorly the median portion of the clypeus broader than either frontal lobe where it passes between them. Cephalic sculpture variable, sometimes absent. Eyes moderate to very large (0·22–0·36 × HW) and situated in front of the midlength of the sides of the head. In profile the eyes usually conspicuously oblique and frequently reniform in shape. Head generally short and broad (CI > 85), but narrower in *alamarum* and *macrops*. Scapes relatively short, SI usually <90. Antennae with 12 segments, terminating in a strongly differentiated club of 3 segments. Propodeal dorsum smooth to reticulate-punctate, never transversely striate or rugose. Propodeal spiracle circular to subcircular. Petiolar spiracle at the node or immediately in front of the anterior face of the node. (Workers examined: all members of group.)

FEMALE. Characters as worker but alate when virgin and with fully developed flight sclerites; distinctly larger than conspecific worker. Eyes larger than worker and ocelli present. (Female examined: *havilandi*.)

MALE. Distinctly much larger than the conspecific worker, closely approaching size of female. Mandibles with 3–4 teeth, the blades longitudinally rugose or striate. Palp formula 2,2 (*notulum*). Antennae with 13 segments, the scape short cylindrical, two or more times longer than broad. First funicular segment shorter than remainder but not globular; remaining funicular segments cylindrical to barrel-shaped, elongate, not tapering or whip-like apically. Eyes large and at the midlength of the sides, with a broad space between their anterior margins and the clypeus (as in Fig. 25). Sides of head behind eyes converging to the broad occipital margin. With the head in full-face view the ocelli not breaking the occipital outline. Notauli absent but parapsidal furrows represented by a pair of unsculptured strips on the mesoscutum. HW slightly greater than maximum width of mesoscutum. Cross-vein *m-cu* absent from forewing. Axillae triangular, small and lateral on the dorsum. Propodeal spiracle small and circular. (Males examined: *notulum*, *havilandi*.)

This is a convenience group, erected to hold 8 southern African species which probably do not represent a holophyletic group but which are nonetheless linked by the characters listed above. The included species show, in the workers, features of both the *salomonis*-group and the *destructor*-group, but do not fall convincingly into either. Males on the other hand are most emphatically of the *salomonis*-group form and are in fact inseparable from those of members of that group. Based on material presently available the members of the *setuliferum*-group appear most likely to have been derived from two loci, or perhaps more, within the *salomonis*-group, but have converged on the *destructor*-group in a number of ways in the worker caste. See the notes under the introduction to the species-groups.

The members of this group fall into three complexes of species, as follows.

The *setuliferum*-complex, including the three very closely related species *ebangaense*, *notulum*, and *setuliferum*, and a couple of peripheral but related taxa. The three named are very close indeed and may eventually prove to be expressions of a single plastic species. Within the group the three are characterized by a lack of standing pilosity on the head and body, presence of strong sculpture, possession of oblique eyes which may or may not be reniform, and presence of relatively broad heads and short scapes (CI 83–90; SI 81–90). Peripheral to this triad is *alamarum*, which shares most of the above characters but has very reduced sculpture and a slightly larger head (CI 79–83), and has a lower petiole node (Fig. 58), although the significance of this last feature cannot be assessed at present. Also peripheral to the three species noted above is *hannonis*, a species obviously close to *setuliferum* but differing in the form of its sculpture and its development of dense pilosity. These five together may well represent a holophyletic group based on their sculpture and eye form, combined with the joint characters of the group diagnosis given above.

The *havilandi*-complex contains only *havilandi* and *xanthognathum*, in which the large eyes are oblique, reniform in the latter but not so in the former. Scapes are relatively short (SI 70–82) and the broad head (CI 86–92) is smooth and unsculptured except for scattered hair-pits. Both species show numerous standing hairs on the head, alitrunk and gaster.

These two are grouped here on what are probably convergencies, and are not really closely related, but so little material of either is available for study that any pronouncements made now would amount to little more than speculation. Suffice to say that the *havilandi* worker is one of only two known Afrotropical species of *Monomorium* to have only 3 teeth on the mandible (the other being *abyssinicum*). It could have been derived from the *setuliferum*-complex above, or independently derived from the *salomonis*-group. The male, described by Arnold (1944), is of the *salomonis*-group form.

M. xanthognathum shows some resemblance to the *destructor*-group but has eyes which are too large and are wrongly shaped to allow its admittance to that group. Also, the diagnostic *destructor*-group character of possession of transverse sculpture on the propodeal dorsum is absent here. The discovery of the male of *xanthognathum* would help our understanding of its taxonomic position, but I would guess that the male would be *salomonis*-like rather than *destructor*-like.

The *macrops*-complex contains only *macrops*. In this species the eyes are large and shifted forwards, but are only slightly oblique and are not reniform. The head is quite long (CI 78–80) but the scapes are relatively short (SI 84–90). Sculpture is extremely reduced on the head but present on the dorsal alitrunk; the head, alitrunk and first gastral tergite all retain standing hairs.

Certainly this species represents a development from the *salomonis*-group independent of any of those listed above. Its origins are presently very obscure but it seems a reasonable hypothesis that its resemblances to both of the complexes discussed above are the result of convergence rather than of real relationship.

Monomorium alamarum sp. n.

(Fig. 58)

HOLOTYPE WORKER. TL 2·1, HL 0·60, HW 0·49, CI 82, SL 0·40, SI 82, PW 0·29, AL 0·56.

Eyes large, conspicuously in front of the midlength of the sides, the maximum diameter of the eye 0·33 × HW and with 8–9 ommatidia in the longest row. In profile the eye distinctly oblique, with its long axis tilted at about 35° to the long axis of the head. The anterior lobe of the eye drawn out anteroventrally down the side of the head and the eye feebly reniform. In profile the promesonotum evenly convex, the metanotal groove not impressed. Dorsal surfaces of head, alitrunk, petiole and postpetiole without standing hairs of any description, but with very sparse fine appressed pubescence present. First gastral tergite with similar appressed pubescence but without standing hairs except for an apical transverse row. Dorsum of head everywhere with vestigial very fine superficial reticular patterning. Dorsal alitrunk more strongly sculptured, finely reticulate-shagreenate on the pronotum to closely reticulate or even reticulate-punctate on the propodeum. First gastral tergite with fine superficial reticular patterning as on the head. Colour uniform dark brown.

PARATYPE WORKERS. TL 2·0–2·4, HL 0·56–0·68, HW 0·45–0·56, CI 79–83, SL 0·38–0·50, SI 80–90, PW 0·26–0·32, AL 0·52–0·66 (12 measured). As holotype but maximum diameter of eye 0·33–0·36 × HW and with 8–10 ommatidia in the longest row.

Holotype worker, **Namibia**: Namib Desert, Ganab, 15° 37′ E, 23° 08′ S, sample G 339, 10.vi. 1982 (*A. C. Marsh*) (BMNH).

Paratypes. 11 workers with same data as holotype; 6 workers, Namib Desert, Tsondab Vlei, 15° 22′ E, 23° 55′ S, sample T 6, 4.iv.1982 (*A. C. Marsh*) (BMNH; MCZ).

Within the *setuliferum*-group as defined above *alamarum* is a very conspicuous species, rendered easily recognizable by the form of its eyes coupled with the lack of standing pilosity on head, alitrunk, and first gastral tergite in front of the apical row, and the superficial reticular patterning faintly present on the head. In all other species included in the group either standing hairs are numerous (*havilandi*, *xanthognathum*, *macrops*), or the head is very obviously densely sculptured (*ebangaense*, *notulum*, *setuliferum*), or both (*hannonis*).

Monomorium ebangaense Santschi **stat. n.**

Monomorium (Xeromyrmex) bicolor st. *ebangaense* Santschi, 1937: 223, figs 17–19. Holotype worker, ANGOLA: Ebanga, 1932–33, no. 142 (*A. Monard*) (CdF) [examined].

Monomorium (Xeromyrmex) nyasae Arnold, 1946: 63, figs 14, 14a. Syntype workers, MALAWI: Mt Zomba foothills, 10.xi.1943 (SAM) [examined]. **Syn. n.**

WORKER. TL 2·5–2·7, HL 0·60–0·64, HW 0·54–0·57, CI 88–90, SL 0·46–0·50, SI 84–88, PW 0·34–0·37, AL 0·70–0·74 (5 measured).

Very close indeed to *notulum* and matching the description given for that species, but the eyes averaging slightly smaller, maximum diameter 0·23–0·26 × HW (as opposed to 0·25–0·28 × HW in *notulum*). Otherwise *ebangaense* and *notulum* differ only by the minor sculptural characters noted in the key. On the whole *ebangaense* has more sharply defined and intense cephalic and pronotal sculpture than *notulum*, where it appears amorphous or smeared. This apparent difference in sculpture may well be a gradient character and hence unreliable, but as material is in short supply the two may be kept separate for the present. I suspect that further collecting will see *ebangaense* and its junior synonym *nyasae*, fall into the synonymy of *notulum*.

M. nyasae, synonymized with *ebangaense* above, shows only a slight variation in colour which I do not consider sufficient to maintain it as separate from *ebangaense*. The former is dull yellow, varying in shade over the body, whilst the latter is dull brownish yellow on the head and alitrunk, and blackish brown on the gaster.

In the original description of *ebangaense* Santschi very erroneously related it to *bicolor*, and presented some startlingly inaccurate and misleading drawings of the holotype. In reality *ebangaense* is closest to *notulum* and *setuliferum*, and should not be confused with any member of the *bicolor*-complex except superficially perhaps with *rufulum*, because that species shows a reduced basal tooth on the mandible as does *ebangaense*. *M. rufulum*, however, has very long strong ammochaete hairs ventrally on the head, is

larger (HW 0·59–0·70), has a much narrower head and longer scapes (CI 75–80, SI 112–120), has eyes situated at the midlength of the sides (Fig. 42), and has the first gastral tergite densely hairy.

MATERIAL EXAMINED

Angola: Ebanga (*A. Monard*). **Malawi**: Mt Zomba foothills (no collector's name).

Monomorium hannonis Santschi

Monomorium hannonis Santschi, 1910: 358. Syntype workers, CONGO: Brazzaville (*A. Weiss*) (NMB; MRAC) [examined].

WORKER. TL 2·7–2·8, HL 0·68–0·70, HW 0·60–0·61, CI 86–90, SL 0·52–0·53, SI 85–88, PW 0·39–0·40, AL 0·76–0·78 (3 measured).

Head short and broad (CI, above), the eyes distinctly in front of the midlength of the sides. Maximum diameter of eye 0·22–0·23 × HW, with 8–9 ommatidia in the longest row. Eyes weakly reniform in profile, the anterior angles of the eyes drawn out anteroventrally into a lobe. Metanotal groove shallowly impressed, the propodeum rounding broadly and evenly into the declivity. Postpetiole very swollen in profile, dome-lie and conspicuously much more voluminous than the petiole. In dorsal view the postpetiole more than twice the area of the petiole node but both segments broader than long. All dorsal surfaces of head and body with numerous standing hairs, the hairs subdecumbent on the first gastral tergite but erect to suberect elsewhere. Several pairs of hairs present on the propodeal dorsum. Occipital margin with projecting hairs across the width and on the curve of the occipital corners in full-face view, but none on sides of head where only short appressed pubescence is present. All surfaces of head, alitrunk, petiole, postpetiole and basal third of the first gastral tergite very densely reticulate-punctate, the sculpture sharply defined. Punctures fading out to superficial reticulation posteriorly on the first gastral tergite. Colour brown, the gaster slightly darker in shade than the head and alitrunk.

A very conspicuous and easily recognized member of the *setuliferum*-group, *hannonis* is isolated by its combination of dense blanketing reticulate-punctate sculpture and numerous standing hairs on all dorsal surfaces of the body. In other species of the group either hairs are absent from the cephalic dorsum, alitrunk and first gastral tergite in front of the apical transverse row (*alamarum*, *ebangaense*, *notulum*, *setuliferum*), or sculpture is feeble to absent on the head and alitrunk dorsum (*havilandi*, *macrops*, *xanthognathum*).

MATERIAL EXAMINED

Congo: Brazzaville (*A. Weiss*).

Monomorium havilandi Forel

Monomorium havilandi Forel, 1910*b*: 443. Syntype workers, female, SOUTH AFRICA: Natal (*Haviland*) (MHN) [examined].

Monomorium (Xeromyrmex) distinctum Arnold, 1944: 11, figs 18a–f. Syntype workers, males, SOUTH AFRICA: Natal, Weenen, x.1939 (*H. P. Thomasset*) (SAM; MCZ) [examined]. **Syn. n.**

Monomorium distinctum var. *leviceps* Arnold, 1958: 119. Syntype workers, SOUTH AFRICA: Cape Prov., Sundays River, vi.1955 (*N. Myers*) (BMNH) [examined]. **Syn. n.**

WORKER. TL 2·8–3·1, HL 0·72–0·76, HW 0·62–0·67, CI 86–90, SL 0·49–0·55, SI 78–82, PW 0·40–0·43, AL 0·74–0·80 (14 measured).

Mandibles with three teeth only, without trace of a reduced fourth tooth or offset denticle as is usual in this group. Eyes not reniform but their ventral margins flat to very shallowly concave, their dorsal margins broadly convex, so that the anterior angle of the eye is narrower and much more narrowly rounded than the posterior angle. Maximum diameter of eye 0·27–0·30 × HW and with 10–12 ommatidia in the longest row. Head relatively short and broad in full-face view, and the scapes short (CI 90 or less, SI <85). Metanotal groove weakly impressed. Short standing hairs present on all dorsal surfaces of head and body, numerous on the first gastral tergite but sparse or rarely absent on the propodeum. Occipital surface of head with superficial reticular patterning at least medially, and dorsum usually with a patch of similar or even fainter patterning in the area immediately behind the frontal lobes, but otherwise the head entirely featureless and smooth except for small hair-pits. Promesonotum dorsally finely superficially reticulate, the surface appearing weakly shagreenate to feebly punctulate in places. Propodeal dorsum finely reticulate-punctate. Sides of alitrunk with faint vestiges of sculpture on the pronotum, the remainder densely reticulate-

punctate. First gastral tergite unsculptured and smooth from base to apex, highly polished. Colour uniform blackish brown to black, the gaster often shiny jet black.

M. havilandi, recorded only from South Africa, is very easily diagnosed as this is the only Afrotropical *Monomorium* except for the very disinctive *abyssinicum* which has only three teeth present on the mandible. All other Afrotropical species have 4 teeth, 3 teeth plus a basal denticle, or in one species (*latinode*), 5 teeth.

In the synonymy *havilandi* and *leviceps* are a perfect match, but *distinctum* shows slightly stronger promesonotal sculpture and has more sharply defined and denser hair-pits on the cephalic dorsum. This is regarded as a very minor character variation, without taxonomic significance at species-level.

Due to a misidentification by Santschi (1917), *havilandi* was treated for some time as a subspecies of *australe* (thus in the catalogues of Wheeler (1922) and Emery (1922)). That Santschi's description was based almost entirely on *havilandi* and not *australe* is indicated by his diagnosis of the mandibles as tridentate, a character correct for *havilandi* but not for *australe* where the usual 4 teeth of the *salomonis*-group are present.

MATERIAL EXAMINED

South Africa: Natal, Weenen (*H. P. Thomasset*); no loc. (*Haviland*); Cape Prov., Sundays River (*N. Myers*); Port Elizabeth (*W. L. Brown*); Grahamstown (*Weatherill & Brown*).

Monomorium macrops Arnold **stat. n.**

(Fig. 59)

Monomorium mediocre subsp. *macrops* Arnold, 1944: 11, figs 17, 17a. Syntype workers, SOUTH AFRICA: Cape Prov., Victoria West (*R. Smithers*) (BMNH) [examined].

WORKER. TL 2·0–2·1, HL 0·54–0·56, HW 0·42–0·45, CI 78–80, SL 0·38, SI 84–90, PW 0·27–0·28, AL 0·54 (3 measured).

Eyes relatively large, maximum diameter 0·31–0·33 × HW, with 8–9 ommatidia in the longest row. Outline shape of body as Fig. 59; the metanotal groove weakly impressed and the petiole with a fairly large and conspicuous anteroventral process. Standing pilosity present on head and body but sparse. On the cephalic dorsum three pairs of hairs are present which straddle the midline behind the level of the frontal lobes. The first pair is situated at about the level of the midlength of the eye, the second behind the level of the eye, and the third at the occipital margin. On the occipital margin is another pair of hairs, situated close to the corners. Pronotum with a pair of standing hairs at the humeri, mesonotum with or without a short pair anteriorly, propodeum hairless. Petiole with one pair and postpetiole with two pairs of backward directed hairs. First gastral tergite with several pairs of hairs on the basal half, the apical half apparently hairless except for the marginal transverse row. Dorsum of head unsculptured except for hair-pits and faint superficial reticular patterning at the occipital border and immediately behind the frontal lobes. Promesonotum weakly reticulate dorsally, the propodeum weakly reticulate-punctulate. First gastral tergite smooth, with vestigial superficial reticular patterning basally. Colour light to medium brown, the gaster slightly darker than the head and alitrunk.

Arnold originally described this form as a subspecies of *mediocre*, but in fact *macrops* is a very distinctive species, not closely related to *mediocre* which has smaller eyes (0·21–0·24 × HW) situated at the midlength of the sides, lacks standing hairs on the head, alitrunk and first gastral tergite (except for the apical transverse row), and retains cephalic sculpture. In fact *macrops*, known only from the South African type-series, is something of an enigma.

As the *setuliferum*-group is presently defined *macrops* should be included, but it has a number of features which strongly indicate that it has acquired these characters independently of any other member of the group. For instance, the sculpture and pilosity of *macrops* appear to represent a reduction of that seen in the *mediocre*-complex and elsewhere in the *salomonis*-group. The head remains relatively long and narrow (CI 78–80), approached only by *alamarum* (CI 79–83) and outside the combined range shown by the remaining species of the group (CI 83–92). The eyes of *macrops*, though large and shifted forward, are not as oblique as in most species (compare Figs 57–59), and the petiole has a relatively large anteroventral process. In summary the origins of *macrops* remain shrouded in mystery. Though indubitably it is derived from somewhere in the *salomonis*-group, it must have arisen from a part of the group different from any other species placed in the *setuliferum*-group as it is presently constructed.

MATERIAL EXAMINED
South Africa: Cape Prov., Victoria West (*R. Smithers*).

Monomorium notulum Forel **stat. n.**

Monomorium setuliferum var. *notula* Forel, 1910*b*: 441. Syntype workers, male, SOUTH AFRICA: Natal (*Haviland*) (MHN) [examined].
Monomorium (Xeromyrmex) setuliferum var. *dolichops* Santschi, 1928: 194. Syntype workers, ZIMBABWE: Victoria Falls (*G. Arnold*) (NMB) [examined]. **Syn. n.**
Monomorium (Xeromyrmex) setuliferum var. *latior* Santschi, 1928: 195. Syntype workers, ANGOLA: Quifangondo (*F. Silvestri*) (NMB) [examined]. **Syn. n.**

WORKER. TL 2·0–2·4, HL 0·53–0·60, HW 0·46–0·52, CI 83–87, SL 0·38–0·42, SI 81–87, PW 0·29–0·34, AL 0·59–0·68 (15 measured).

Eye in profile distinctly in front of midlength of side, its anterior angle drawn out into a lobe or blunt point which is directed anteroventrally; the eye not reniform but very obviously much more narrowly rounded anteriorly than posteriorly. Maximum diameter of eye 0·25–0·28 × HW and with 8–9 ommatidia in the longest row. Shape and size of eye showing variation even in a single series. Ventral surface of head with elongate curved hairs present. Metanotal groove impressed in profile. Standing hairs extensively suppressed on dorsal surfaces of body; absent from head behind level of frontal lobes, absent from alitrunk, absent from first gastral tergite in front of the apical transverse row. Fine appressed pubescence is present on all dorsal surfaces of head and body. Dorsum of head blanketed by reticulate-punctate to reticulate-shagreenate sculpture, the mid-dorsal area commonly overlaid by extremely fine scratch-like striolae. Punctate component of sculpture not sharply defined on posterior third of cephalic dorsum but instead with a smeared or amorphous appearance, which may extend over the whole head in some cases. Pronotal dorsum with partially effaced or shagreened reticulate-punctate sculpture, remainder of alitrunk finely reticulate-punctate. First gastral tergite reticulate-shagreenate basally, fading out to superficial reticular patterning apically. Colour brown, varying from yellowish to dark, but usually with the gaster darker in shade than the alitrunk.

Very closely related to *ebangaense*, *notulum* is separated only by the minor sculptural characters noted in the key and its slightly larger eyes. Both of these are close to, and perhaps inseparable from, *setuliferum* where the eyes are larger still but tend to be distinctly reniform in shape. Within the bounds of the *setuliferum*-group as defined above, these three forms are distinguished by their dense blanketing sculpture and very reduced dorsal pilosity.

MATERIAL EXAMINED
Angola: Quifangondo (*F. Silvestri*). **Zimbabwe**: Springvale (*G. Arnold*); Hillside (*G. Arnold*); Bulawayo (*G. Arnold*); Victoria Falls (*G. Arnold*). **South Africa**: Natal (*Haviland*); Transvaal, Nelspruit (*M. Samways*).

Monomorium setuliferum Forel

(Fig. 57)

Monomorium setuliferum Forel, 1910*c*: 16. Syntype workers, BOTSWANA: Kalahari, Khakea (*L. Schultze*) (MHN; MCZ) [examined].

WORKER. TL 2·5–2·7, HL 0·54–0·63, HW 0·47–0·55, CI 86–90, SL 0·40–0·49, SI 85–90, PW 0·30–0·35, AL 0·64–0·74 (15 measured).

Eyes conspicuously in front of midlength of sides, markedly oblique with respect to the long axis of the head and usually distinctly reniform in profile, drawn out into a lobe anteroventrally which extends forward and downward on the side of the head anteriorly. Shape of eye variable even in a single series but conforming to this general pattern. Maximum diameter of eye 0·29–0·33 × HW and with 9–10 ommatidia in the longest row. Ventral surface of head with a number of long, anteriorly curved hairs. Metanotal groove shallowly impressed in profile. Standing hairs extensively suppressed on dorsal surfaces; absent from head behind level of frontal lobes, absent from alitrunk, absent from first gastral tergite except for the apical transverse row. Nodes of petiole and postpetiole each with a single pair of backward directed hairs. Fine appressed pubescence is present on all dorsal surfaces. Dorsum of head blanketed by reticulate-punctate to reticulate-shagreenate sculpture, usually with an extensive mid-dorsal patch which has

extremely fine scratch-like striolae superimposed on the ground-sculpture. Dorsum and sides of alitrunk finely and densely reticulate-punctate everywhere, dorsally the punctures usually more sharply defined on the propodeum than on the pronotum, laterally the pronotum often reticulate rather than reticulate-punctate. First gastral tergite reticulate-shagreenate basally, fading to superficially reticular apically on the sclerite. Colour varying from yellowish brown to dark brown, the gaster often darker in shade than the alitrunk; sometimes the head also darker than the alitrunk.

M. setuliferum is distinguished from *notulum* and *ebangaense* only by relatively feeble characters pertaining to the size and shape of the eyes. Thus in *setuliferum* the maximum diameter of the eye is 0·29–0·33 × HW and the eye in profile is conspicuously reniform. In *notulum* and *ebangaense* the eye averages smaller, maximum diameter 0·23–0·28 × HW and is not reniform but rather has the anterior angle drawn out into a more or less straight lobe which is directed anteroventrally on the side of the head. In both *notulum* and *setuliferum* the eye shows variation in shape, and further collecting may force the synonymy of all three names, as *notulum* and *ebangaense* are only separated by weak sculptural differences which may merely reflect variation in a single species.

MATERIAL EXAMINED

Botswana: Kalahari, Khakea (*L. Schultze*); Okavango Delta, Shorobe (*A. Russell-Smith*).

Monomorium xanthognathum Arnold

Monomorium xanthognathum Arnold, 1944: 9, figs 15, 15a. Syntype workers, SOUTH AFRICA: Cape Town, nr Lion's Head, 10.v.1939 (BMNH; MCZ) [examined].

WORKER. TL 1·9–2·3, HL 0·48–0·56, HW 0·44–0·51, CI 88–92, SL 0·30–0·37, SI 70–77, PW 0·26–0·30, AL 0·48–0·52 (3 measured).

Mandibles unsculptured, smooth and shining; the only species in either the *setuliferum*-group or the Afrotropical *salomonis*-group fauna to have entirely smooth mandibles. Eyes conspicuously far in front of the midlength of the sides, the maximum diameter of the eye 0·32–0·33 × HW. In profile the eyes reniform and strongly oblique with respect to the long axis of the head. Anterior lobe of eye extending forward and downward on the side of the head and in larger workers almost rounding onto the ventral surface of the head. In full-face view the head broad and the scapes relatively short (CI > 85, SI <80). Metanotal groove deeply impressed in profile. Dorsal surfaces of head, alitrunk, petiole, postpetiole and gaster with sparse standing hairs present and with sparse but relatively long decumbent to appressed pubescence on head, alitrunk and gaster dorsally. Dorsal surfaces of head, alitrunk and gaster smooth and shining, unsculptured and featureless except for scattered hair-pits. Sides of alitrunk unsculptured except for the mesopleuron which is punctulate-rugulose, and the bulla of the metapleural gland which has some faint sculpture present. Colour glossy blackish brown to jet black, the mandibles conspicuously bright yellow.

A very easily recognizable species, the form of the eyes and mandibles, and the form of sculpture and pilosity coupled with the dimensions given above render *xanthognathum* unlikely to be confused with any other Afrotropical *Monomorium*.

The affinities of *xanthognathum* are, however, in doubt for, although it fits best with other members of the *setuliferum*-group it is the species which, except for its eyes, most resembles the constituents of the *destructor*-group. It would be useful to know the male of *xanthognathum* as this would probably solve the problem immediately, as the known males of the two groups are quite different. For the present, on the evidence of the form of the eyes and lack of transverse sculpture on the propodeal dorsum, I am inclined to place *xanthognathum* in the *setuliferum*-group rather than in the *destructor*-group.

MATERIAL EXAMINED

South Africa: Cape Town (no collector's name).

The *monomorium*-group

(Figs 23, 61–92)

WORKER. Monomorphic, frequently with size variation in any series but without allometric variation. Mandibles unsculptured, the masticatory margin usually with 4 teeth which decrease in size from apex to base. More rarely the mandible with 3 teeth plus a minute basal denticle; a very few species with only 3 teeth and none with 5 teeth. Trulleum small to obliterated, when present frequently closed. Palp formula

predominantly 2,2 but reduced to 1,2 in minute species. Median portion of clypeus raised, usually projecting forward anteriorly and longitudinally bicarinate but the carinae feeble or fading anteriorly in a few species. Median portion of clypeus posteriorly broader than either of the frontal lobes where it passes between them. Anterior clypeal margin without a widely separated pair of teeth although the anterior ends of the clypeal carinae may project as sharp angles or teeth. Cephalic dorsum unsculptured and glassy smooth except for scattered hair-pits. Eyes always present and distinct, size small to large (0·15–0·38 × HW) and generally with 4 or more ommatidia in the longest row. Eyes usually situated in front of the midlength of the sides in full-face view; close to or at the midlength in only a few species-complexes. Eyes roughly circular to elongate-oval in profile, never reniform or extended anterolaterally into a lobe. Head always longer than broad (CI 72–89), scapes very variable in length (SI 72–110). Antennae with 10 to 12 segments, terminating in a strong club of 3 segments. Metanotal groove moderately to strongly impressed, with distinct cross-ribs. Propodeal spiracle circular to subcircular. Propodeal dorsum rounding into declivity, not angulate or dentate. Promesonotal dorsum unsculptured. Propodeal dorsum usually unsculptured but rarely it may be reticulate-punctate; never transversely striate or rugulose. Petiolar spiracle at the node. Body pilosity variable in distribution but usually conspicuous, only extremely rarely absent from the dorsal alitrunk. Mesopleuron and metapleuron often smooth but may retain faint sculpture. Petiole, postpetiole and gaster usually unsculptured, very rarely otherwise. (Workers examined: all included in this revision plus about 50 extralimital forms of the group, including *andrei* Saunders, *atomum* Forel, *carbonarium* Smith, *chinense* Santschi, *clavicorne* André, *cooperi* Donisthorpe, *cyaneum* Wheeler, *donisthorpei* Crawley, *ebeninum* Forel, *fieldi* Forel, *intrudens* Smith, *javanum* Forel, *laeve* Mayr, *minimum* (Buckley), *monomorium*, *orientale* Mayr, *triviale* Wheeler, *viridum* Brown, *wheelerorum* DuBois.)

Female. Characters generally as worker but female much larger; female slightly smaller to slightly larger than conspecific male. Eyes larger than in worker and positioned at or close to the midlength of the head. Ocelli present. Mandibles as worker but dentition much reduced or bizarre in some socially parasitic species. Antennae with 11 or 12 segments, with a 3-segmented club. HW greater than maximum width of mesoscutum or the two about equal. Alitrunk usually winged and with a full complement of flight sclerites, but several apterous forms are known (*carbonarium*, *ebeninum*, *floricola*, *mictilis*, *minimum*). Alitrunk long and narrow in dorsal view, long and low in profile. Parapsidal grooves distinct to absent. Axillae triangular in dorsal view, separated by a small mid-dorsal gap or just meeting at the midline; axillae partially to entirely fused to mesoscutum in apterous females. Forewings with cross-vein *m-cu* absent and the venation frequently much reduced, with many veins faint to vestigial and not tubular. Head, alitrunk and gaster usually unsculptured but some with weak sculpture on the head behind the lateral portions of the clypeus and behind the frontal lobes. Lateral alitrunk sometimes sculptured in part. First gastral tergite unsculptured. Pilosity always present on dorsal surfaces of body, often abundant. (Females examined: *arboreum*, *balathir*, *boerorum*, *carbonarium*, *draxocum*, *ebeninum*, *egens*, *exchao*, *exiguum*, *fastidium*, *firmum*, *floricola*, *guillarmodi*, *hospitum*, *intrudens*, *mictilis*, *minimum*, *monomorium*, *musicum*, *occidentale*, *pergandei*, *rhopalocerum*, *rosae*, *rotundatum*, *schultzei*, *torvicte*, plus 6 unidentified species.)

Male. Slightly smaller to slightly larger than the conspecific female, much larger than the worker. Mandibles meeting medially at full closure, with 3 teeth and frequently also with a minute basal denticle. Palp formula 2,2 or 1,2. Scape cylindrical or subcylindrical, variable in length but usually about equal to the second funicular segment or a little longer. First funicular segment not globular, the remainder of the funiculus not strongly tapering apically, not whip-like. Head capsule wider behind the eyes than in front, the maximum head width about equal to the maximum width of the mesoscutum. Eyes large and sited just in front of the midlength; always a space present between eye and mandibular base in full-face view, the eye not touching the clypeus. Ocelli large but not born on a turret nor breaking the outline of the occipital margin. Mesoscutum overhanging pronotum anteriorly. Notauli absent and mesoscutum usually lacking a narrow V-shaped anteromedian area which is less sculptured than the surrounding area. Parapsidal grooves present to absent. Axillae small, triangular in dorsal view and separated by a small gap medially. Propodeal spiracle in front of the midlength of the side. Venation as alate female. Head sculptured, remainder of body variable but usually smooth, sometimes the mesoscutum and scutellum sculptured. First gastral tergite unsculptured. Genitalia large and partially exserted. Body with pilosity dorsally. (Males examined: *cooperi*, *ebeninum*, *exchao*, *exiguum*, *floricola*, *monomorium*, *pergandei*, *rosae*, plus two unidentified species.)

This is the largest species-group currently recognized within *Monomorium*, containing 69 known Afrotropical species and an unknown but quite large number of extralimital forms. Members of the group occur in all zoogeographical regions but the group is predominantly Afrotropical. At least one member,

floricola, is an accomplished and very widespread tramp-species in the tropics and subtropics. On occasion *floricola* also occurs in the temperate zones in hothouses and other constantly heated buildings.

Most species of the *monomorium*-group are small to minute and are only poorly represented in collections. Their biologies are mostly utterly unknown but the vast majority of species inhabit the leaf litter or topsoil layer. Several nest and forage arboreally or subarboreally and some have only been found in trees. As elsewhere in this publication the species-group is defined on a world-wide basis, and fundamentally the group contains all those species whose monomorphic workers have mostly or entirely unsculptured head and body, reasonably large eyes, fewer than 5 mandibular teeth with unsculptured mandibular blades, PF 2,2 or less, a rounded propodeum, and conspicuous dorsal pilosity. As elsewhere in the genus the definitions based on females and males are somewhat less certain as so few are known, but males always lack cross-vein *m-cu* in the forewing and lack all those characters diagnostic of the *scabriceps*-group and the *destructor*-group. Further study will almost certainly detect ways to subdivide what is here termed the *monomorium*-group into smaller groups. I have attempted here to define meaningful species-complexes as they occur in the Afrotropical region but have not carried this investigation over to the extralimital species. Shortage of material is a limiting factor in this survey and it is freely admitted that some of the Afrotropical species-complexes discussed below are for convenience only, whilst others certainly constitute holophyletic assemblages.

The *monomorium*-group definition outlined above includes all the species previously placed in the subgenus *Monomorium* s.str. or given as related to *M. minutum* (now *monomorium*) in the catalogues of Wheeler (1922) and Emery (1922), with the exception of those species excluded in this study. Forms previously placed elsewhere but now added to the *monomorium*-group include the inquiline species formerly constituting *Epoecus* and *Corynomyrmex*, and the disparate forms with 11-segmented antennae originally grouped together on the strength of this spurious character under the subgenus *Lampromyrmex* (= *Mitara*).

Afrotropical species-complexes of the *monomorium*-group (based on workers)

The *altinode*-complex. The members of this complex appear to constitute a holophyletic lineage and are linked by possession of the following characters. Clypeal carinae are sharp and conspicuous, close together posteriorly and widely divergent anteriorly. The anterior clypeal margin has a prominent median section which is flanked by a pair of teeth, denticles or projecting acute angles at the apices of the clypeal carinae (Fig. 62). Antennae 12-segmented and the scapes not reaching the occipital margin when laid straight back. With the head in full-face view the eyes are distinctly in front of the midlength of the sides; in profile the eyes are usually elongate-oval and have a maximum diameter 0·20–0·28 × HW. The head capsule in profile is somewhat dorsoventrally flattened, with the dorsum, venter or both flat to shallowly convex. Usually the head becomes deeper posteriorly. Petiole node high and narrow in profile (Figs 84–88), anteroposteriorly slightly compressed and the peduncle subtended by a small or inconspicuous anteroventral process. Postpetiole high and narrow, also anteroposteriorly compressed and with a high vertical anterior face.

This quite conspicuous complex includes 9 species (*altinode*, *angustinode*, *arnoldi*, *captator*, *fugelanum*, *mirandum*, *occidentale*, *tynsorum*, *vonatu*) which are very widely distributed in sub-Saharan Africa. The distinctive structure of the clypeus is shared with the *katir*-complex and the *leopoldinum*-complex, but both of these lack the apomorphic petiole and postpetiole configuration shown by the *altinode*-complex. The female of *occidentale* is known but otherwise all sexual forms are unknown in this complex.

The *katir*-complex. The clypeus, antennae and head shape correspond to that seen in the *altinode*-complex but the eyes, situated in front of the midlength, are relatively very large (0·30–0·38 × HW), with their posterior margins at or very close to the midlength of the sides. Also the petiole is subconical in profile and the postpetiole rounded, lacking the characteristic shape of the foregoing complex.

The four large-eyed species of this small complex (*balathir*, *holothir*, *manir*, *katir*) appear to be derived from the same source as the *altinode*-complex, that source may well be the *leopoldinum*-complex. All three share the same characteristic clypeal structure and it may be postulated that the *altinode*-complex consists of relatives of the *leopoldinum*-complex which have evolved a specialized petiolar and postpetiolar structure, whilst the *katir*-complex consists of relatives of the *leopoldinum*-complex which have evolved enlarged eyes. The female of *balathir* is known, males remain unknown in this complex.

The *leopoldinum*-complex. Clypeus, antennae and head shape as described for the *altinode*-complex. Eyes in front of the midlength of the sides but of moderate size (0·18–0·27 × HW). Petiole subconical and postpetiole rounded, lacking the high narrow aspect of the *altinode*-complex.

The 6 species included here (*borlei*, *lene*, *leopoldinum*, *pallidipes*, *rastractum*, *springvalense*) have much the same general appearance as the two complexes noted above, but they lack the specialized petiole and

postpetiole of the *altinode*-complex and the enlarged eyes of the *katir*-complex. All species of the *leopoldinum*-complex are of eastern or southern Africa, their sexuals are not known.

The *schultzei*-complex. Clypeal carinae sharp, close together, parallel or only feebly divergent anteriorly. Anterior margin of projecting median portion of clypeus without prominent acute angles, teeth or denticles. Antennae 12-segmented and relatively long (SI 95–110), the scapes when laid straight back reaching or slightly exceeding the occipital margin or rarely failing to reach the margin only by a mere fraction of their apical width. Eyes in profile appearing round or subcircular (rather than elongate-oval), in full-face view the eyes at or close to the midlength of the sides; in general the posterior margins of the eyes are at the midlength. Head capsule in profile distinctly biconvex, not dorsoventrally flattened. Head deepest just behind level of eye or close to the midlength. Promesonotum and propodeum in profile each forming a distinct convexity, separated by the metanotal groove. Petiole node small and subconical in profile. Subpetiolar process inconspicuous, either a small anteroventral lobe or a narrow strip. Postpetiole in profile low and rounded, smaller than the petiole and lacking a high vertical anterior face.

The 10 species included here (*arboreum*, *bevisi*, *crawleyi*, *excensurae*, *fasciatum*, *firmum*, *kineti*, *schultzei*, *speluncarum*, *vecte*) form a close-knit complex of related forms and probably represent a holophyletic lineage. The species are restricted to eastern and southern Africa and are apparently related to the *rhopalocerum*-complex, whose members share a similar overall distribution. Males of the *schultzei*-complex remain unknown but females of *arboreum*, *firmum* and *schultzei* are represented in collections.

The *rhopalocerum*-complex. Clypeal structure as in the *schultzei*-complex and also matching that complex in alitrunk, petiole and postpetiole structure. Eyes in the *rhopalocerum*-complex are more elongate than in *schultzei* and allies and are very obviously situated in front of the midlength of the sides. The antennal scapes when laid straight back from their insertions fail to reach the occipital margin (except in *binatu* where they just reach), and the antennae are always 12-segmented. The head capsule in profile is shallowly biconvex, its deepest point at about the midlength.

On the whole the five southern and eastern African species included here (*binatu*, *exchao*, *rhopalocerum*, *symmotu*, *tablense*) are remarkably similar to the members of the *schultzei*-complex but have shorter scapes, forward shifted eyes and somewhat more flattened heads. Females are known for *exchao* and *rhopalocerum*, males for *exchao* alone.

The *strangulatum*-complex. Clypeal carinae sharply developed, widely separated and only feebly divergent anteriorly. The points at which the clypeal carinae meet the anterior clypeal margin are not marked with prominent angles or denticles. Antennae with 11 or 12 segments and when laid straight back the scapes surpass the occipital margin (except in *egens*). With the head in full-face view the posterior margins of the eyes are approximately at the midlength of the sides. In profile the eyes are round to subcircular (rather than elongate-oval). Head capsule in profile distinctly biconvex, deepest just behind the level of the eye or at the midlength. Occipital margin usually convex in full-face view. Petiole with a long anterior peduncle, subtended by a minute anteroventral process. Postpetiole low and rounded.

One species with 11 antennal segments (*strangulatum*) and four with 12-segmented antennae (*draxocum*, *egens*, *gabrielense*, *noxitum*) are included here. Of the five all but *egens* are obviously closely related, but in *egens* the anterior clypeal margin tends to be concave and the pronotum is flattened with accentuated angular humeri; features not seen in the other four. All species occur in western and central Africa and morphologically appear intermediate between the *schultzei*- and *rhopalocerum*-complexes and the *malatu*-complex. They are particularly close to the latter but lack its characteristic petiolar structure. Males are not known for any species in this complex but females of *egens* and *draxocum* have been examined.

The *malatu*-complex. Characters of this small complex are the same as those of the *strangulatum*-complex, and species with both 11 and 12 antennal segments are also included here. The structure of the petiole is, however, different, the node of *malatu*-complex members being high and either narrowly subconical or cuneate in profile. The anterior peduncle is short and stout, and is subtended by a relatively large anteroventral process which is usually in the form of a broad, anteriorly truncated lamellate strip. In most species the standing hairs of the head, alitrunk and gaster tend to be blunt or truncated apically.

Of the five species represented here four (*affabile*, *disoriente*, *malatu*, *tanysum*) have 12 antennal segments, the fifth (*dolatu*) has only 11. Most species are of west or central African origin but *disoriente* is known only from Tanzania. Sexual forms of all species remain to be discovered.

The *iyenasu*-complex. A single rather strange species from Tanzania, *iyenasu*, is included here. Known only from the worker it is immediately diagnosed by its relatively large size for a member of the *monomorium*-group (HW > 0·70), 12-segmented antennae with short scapes (SI <80), small eyes (0·19 × HW) and very dense pilosity. It lacks obvious relatives among the Afrotropical fauna and may represent an introduction from outside the region.

The *bequaerti*-complex. A small complex containing only three species and characterized by possession of 11-segmented antennae and a relatively large postpetiole. In profile the postpetiole is equal to or

somewhat more voluminous than the petiole, and has a long, gradually sloping posterior face. Of the species included here *bequaerti* is known only from Zaire, and *pulchrum* only from Zimbabwe, but *rosae* is widely distributed in west and central Africa. Males and females of *rosae* are known but they have not yet been found for the other two species.

The *boerorum*-complex. A large complex of 21 species comprising all those forms which do not fit any of the above complexes, and hence merely lumped here for convenience. Of the species involved seven (*exiguum*, *fastidium*, *guillarmodi*, *mictilis*, *spectrum*, *taedium*, *vaguum*) have 11 antennal segments and usually show reduced eyes in which a single median longitudinal row of 2–4 ommatidia is enclosed by an outer ring of ommatidia. A number of species with 12-segmented antennae also show this eye structure (*inquietum*, *rotundatum*, *shilohense*, *sryetum*, *trake*) as does the tramp-species *floricola*. The remainder, which have 12-segmented antennae, all show a normal eye with two or more longitudinal rows of ommatidia within the outer ring (*boerorum*, *braunsi*, *kelapre*, *lubricum*, *mavide*, *musicum*, *nuptualis*, *paternum*, *torvicte*). These last named tend to have a narrow blade-like subpetiolar process. Despite this there is a tendency to variation in the characters mentioned and a few exceptions to the characters; it is not possible to make any meaningful division of the complex at the present time.

The vast majority of species included here are restricted to the territories of southern Africa. Species which occur in southern Africa and elsewhere on the continent include *exiguum*, *mictilis*, and *vaguum*, but each of these names may conceal more than one valid species. Only three species are found away from southern Africa, namely *inquietum* (Zaire), *spectrum* (Gabon), and *trake* (Ghana).

Monomorium affabile Santschi

Monomorium affabile Santschi, 1926*a*: 235, fig. B. Holotype worker, ZAIRE: Banzyville (*R. P. Augustin*) (NMB) [examined].

WORKER. TL 1·5, HL 0·42, HW 0·34, CI 81, SL 0·30, SI 88, PW 0·22, AL 0·40.

Answering the description of *malatu* but smaller, with a narrower head and longer scapes; see comparative dimensions below. Clypeus constructed as in *malatu* but carinae sharply developed, divergent anteriorly and reaching the anterior margin at the anterolateral angles of the projecting portion of the clypeus. Maximum diameter of eye 0·24 × HW, and with 5 ommatidia in the longest row. With the head in full face view the sides subparallel.

M. affabile and *malatu* are very closely related and eventually may even prove to be synonymous. Apart from the few minor differences mentioned above the main discriminating features which presently separate the two are the dimensions and ratios, as follows.

	affabile	*malatu*
TL	1·5	1·9–2·1
HW	0·34	0·38–0·46
CI	81	88–92
SL	0·30	0·33–0·38
SI	88	80–85
PW	0·22	0·26–0·28
AL	0·40	0·50–0·54

Monomorium altinode Santschi

(Fig. 85)

Monomorium rhopalocerum var. *altinodis* Santschi, 1910: 359, fig. 4. Holotype worker, CONGO: Brazzaville (*Weiss*) (NMB) [examined].

Monomorium altinode Santschi; Santschi, 1914*b*: 18. [Raised to species.]

Monomorium altinode var. *bondroiti* Santschi, 1920*b*: 10, fig. 1f. Holotype worker, ZAIRE: Upper Lukuga (*Bondroit*) (NMB) [examined]. **Syn. n.**

Note. The holotype of *bondroiti* is badly damaged, the post-alitrunkal segments all missing.

WORKER. TL 1·7, HL 0·48, HW 0·37, CI 77, SL 0·32–0·33, SI 87–89, PW 0·24–0·26, AL 0·48 (2 measured).

Clypeal carinae sharply developed and strongly divergent anteriorly, the carinae and the median anterior clypeal margin forming a near-equilateral triangle. Projecting median portion of anterior clypeal

margin flanked by a low but quite broad triangular prominence or denticle on each side, which separates the transverse to shallowly concave anterior margin from the lateral margin of the projecting portion on each side. Maximum diameter of eye 0·22–0·24 × HW and with 6 ommatidia in the longest row. With the head in full-face view the eyes conspicuously in front of the midlength of the sides and the scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head very shallowly convex in full-face view, the occipital margin broad and very feebly concave medially. Promesonotal outline high and convex in profile, on a much higher level than the propodeum. Mesonotum sloping evenly to the shallowly impressed metanotal groove. Propodeal dorsum sloping posteriorly and rounding broadly into the declivity. Propodeal spiracle small but not pinhole-like, not dominating the side of the sclerite. Petiole node in profile high and narrow, anteroposteriorly compressed and narrowly rounded above. Postpetiole lower and more broadly rounded than petiole but with a vertical anterior face. All dorsal surfaces of head and body with standing hairs, the promesonotum with 5 pairs and the propodeum with 2 pairs. Sculpture absent except for cross-ribs at the metanotal groove. Colour yellow.

M. altinode is very closely related to *arnoldi*, *fugelanum* and *tynsorum*, the four together forming a very uniform agglomeration. On present evidence I regard them as separate species, but further collecting may reduce the taxonomic distance between some or all of them. For the present the four are separated by their dimensions and some small morphological features. Their critical dimensions compare as follows.

	SI	HW	CI	Diameter of eye × HW
arnoldi	95–98	0·40–0·41	74–77	0·20–0·22
tynsorum	90–95	0·40–0·44	78–81	0·24–0·25
fugelanum	92–95	0·36–0·39	74–78	0·26–0·28
altinode	87–89	0·37	77	0·22–0·24

Apart from this *tynsorum*, marginally the largest and broadest-headed species, has 7–8 pairs of hairs on the promesonotal dorsum (as opposed to 5 pairs in the remaining species), and has the petiole node somewhat thicker in profile than the remainder (Fig. 87). Its propodeal spiracle is not reduced in size and the curve of the promesonotal outline is not strongly convex. In *fugelanum*, which is relatively small and has the largest eyes of the four species under consideration, the propodeal spiracle is minute (Fig. 88) and the petiole node narrow. *M. altinode* (Fig. 85) has the shortest scapes of the four and has the promesonotal outline most strongly convex, whilst *arnoldi* (Fig. 86), the species with the longest scapes and smallest eyes, tends to develop a weak dorsolateral crest on the petiole node which may extend down the upper portion of the side of the node.

MATERIAL EXAMINED

Congo: Brazzaville (*Weiss*). **Zaire**: Upper Lukuga (*Bondroit*).

Monomorium angustinode Forel

(Fig. 84)

Monomorium angustinode Forel, 1913*a*: 334. Syntype workers, ZAIRE: Katanga (= Shaba), Welgelegen, 14.vi.1912, no. 123 (*Bequaert*) (MNH; BMNH; MRAC) [examined].

WORKER. TL 1·9–2·0, HL 0·52–0·54, HW 0·39–0·40, CI 74–77, SL 0·36, SI 90–92, PW 0·26–0·28, AL 0·54–0·58 (6 measured).

Clypeal carinae well defined, widely separated and divergent anteriorly, terminating at the anterior clypeal margin in a pair of short projecting denticles. Anterior margin of prominent median portion of clypeus shallowly concave between the pair of short denticles, the latter separating the anterior and lateral margins of the median clypeus. Margin usually with a small indentation at socket of median seta. Maximum diameter of eye 0·24–0·26 × HW and with 7–8 ommatidia in the longest row. In full-face view the eyes distinctly in front of the midlength of the side and the antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Occipital margin broad in full-face view, the sides straight to feebly convex behind the level of the eyes. Promesonotal dorsum shallowly convex in profile, the mesonotum sloping evenly to the narrow but distinctly impressed metanotal groove. Cross-ribs of metanotal groove short. Propodeal dorsum with a short convex portion immediately behind the metanotal groove, the surface then sloping evenly backwards; the dorsum and declivity forming a single curve, the two not obviously separated. Propodeal spiracle small and placed high on the side of the sclerite. In dorsal view the spiracular orifices prominent, born at the apices of a pair of low tubercles, the dorsum between

them broad and almost flat. Petiole high and narrow, scale-like and narrowly rounded above. Subpetiolar process a narrow inconspicuous strip. Postpetiole anteroposteriorly compressed, lower than the petiole and slightly more broadly rounded above, but with a high vertical anterior face. All dorsal surfaces of head and body with standing hairs present, the promesonotum apparently with 4–5 pairs though all specimens available show signs of abrasion. Apart from small hair-pits and the feeble cross-ribs at the metanotum the entirety of the head and body is devoid of sculpture. Colour light brownish yellow, the head and gaster tending to be somewhat darker than the alitrunk.

M. angustinode belongs to the *altinode*-complex but is distinguished from all its close relatives by the shape of the propodeum and structure of the propodeal spiracles.

MATERIAL EXAMINED

Zaire: Shaba, Welgelegen (*Bequaert*)

Monomorium arboreum Weber **stat. n.**

(Fig. 65)

Monomorium (Monomorium) minutum subsp. *arboreum* Weber, 1943: 360. Syntype workers, female, SUDAN: Imatong Mts, 6200 ft (1890 m), 2.viii.1939, no. 1397 (*N. A. Weber*) (MCZ) [examined].

WORKER. TL 2·1–2·3, HL 0·48–0·60, HW 0·39–0·46, CI 77–81, SL 0·38–0·48, SI 96–104, PW 0·25–0·30, AL 0·54–0·68 (15 measured).

Clypeal carinae narrow but sharply defined, moderately divergent anteriorly and not terminating in a pair of denticles at the anterior clypeal margin. Anterior margin and lateral margins of the prominent median portion of the clypeus meeting in a poorly defined obtuse angle. Maximum diameter of eye 0·20–0·24 × HW and with 6 ommatidia in the longest row. Outer circle of ommatidia enclosing more than one longitudinal ommatidial row. In full-face view the eyes with their posterior margins at or just behind the midlength of the sides and the scapes, when laid straight back from their insertions, just reaching the occipital margin. Sides of head almost parallel but feebly convergent posteriorly, rounding broadly and evenly into the relatively short occipital margin; the latter almost transverse, only with the feeblest median concavity in full-face view. Promesonotum evenly convex in profile, the highest point just in front of the midlength. Metanotal groove broad but only shallowly impressed and the propodeal dorsum behind the groove shallowly sloping posteriorly. Apex of promesonotal convexity on a much higher level than the propodeal dorsum, and the propodeal spiracle large and very conspicuous. Propodeal dorsum and declivity meeting in a rounded angle, the two surfaces with decidedly different slopes and not forming a single sloping surface. Subpetiolar process varying from a small lobe to a small blunt triangle. Petiole node in profile relatively low, subconical, with a narrowly rounded dorsum. Postpetiole smaller than petiole, its dorsal surface evenly broadly rounded in profile. All dorsal surfaces of head and body with standing hairs present, the promesonotal dorsum with 4–6, or very rarely 7 pairs present. Mandibles and dorsum of head unsculptured except for small pits from which hairs arise. Mesopleuron reticulate. Metanotal groove strongly and conspicuously cross-ribbed, the cross-ribs extending down the sides of the alitrunk; alitrunk otherwise unsculptured, smooth and shining. Petiole, postpetiole and gaster unsculptured. Colour dull yellow, the head dorsally and the first gastral tergite usually slightly darker in shade than the alitrunk and often with a brownish yellow tint.

Weber (1943) discovered this species nesting in humus about the base of a large fern which was growing epiphytically on a forest tree about 5 m above the ground. As indicated by the Kenyan samples noted below, which were taken from forest leaf litter, a subarboreal lifeway is not obligatory and it is more probably the case that *arboreum* is normally a litter-layer species which, in the case of Weber's sample, was taking advantage of a functional but unusual nest-site.

Weber described *arboreum* as a subspecies of *minutum* Mayr, to which it is not truly related. *M. arboreum* belongs instead to the small complex of Afrotropical species including *schultzi*, *firmum* and their allies, and is a valid species in its own right. Its closest relative appears to be the Ethiopian *crawleyi* but that species has a very broad metanotal groove which forms a distinctive shallow U-shaped trough in the alitrunk outline.

MATERIAL EXAMINED

Sudan: Imatong Mts (*N. A. Weber*). **Kenya**: Narok, Loita Hills, Morijo (*V. Mahnert & J. L. Perret*); Embu, Irangi For. Sta. (*V. Mahnert & J. L. Perret*); Ishiara (*V. Mahnert & J. L. Perret*); Kirimiri For. (*V. Mahnert & J. L. Perret*); Taita Hills (*V. Mahnert*).

Monomorium arnoldi Forel

(Fig. 86)

Monomorium arnoldi Forel, 1913*b*: 137. Syntype workers, Zimbabwe: Matopo Hills (*G. Arnold*) (BMNH; MHN; MCZ) [examined].

Worker. TL 2·0–2·1, HL 0·52–0·54, HW 0·40–0·41, CI 74–77, SL 0·38–0·40, SI 95–98, PW 0·23–0·25, AL 0·48–0·52 (7 measured).

Clypeal carinae well developed, widely divergent anteriorly and running to the margin. Space between the carinae shallowly transversely concave in front of the level of the frontal lobes. Clypeal carinae terminating in a pair of projecting low denticles, the anterior margin of the prominent median portion of the clypeus shallowly concave between them. Maximum diameter of eye 0·20–0·22 × HW and with 5–6 ommatidia in the longest row. With the head in full-face view the eyes distinctly in front of the midlength of the sides and the scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head straight to shallowly convex in full-face view, rounding posteriorly into the broad occipital margin, which is transverse to feebly concave. Promesonotum convex in profile, sloping posteriorly to the impressed metanotal groove; the latter traversed by short but conspicuous cross-ribs. Propodeal dorsum evenly convex, its spiracle small. Petiole node high and narrow, anteroposteriorly compressed and narrowly rounded above. Subpetiolar process a narrow and inconspicuous strip. Postpetiole with a high vertical anterior face, more broadly rounded above than the petiole node. All dorsal surfaces of head and body with standing hairs, the promesonotum with 5–6 pairs (possibly more as all available material is somewhat abraded). Head and body entirely smooth except for minute hair-pits, metanotal cross-ribs and some very faint sculptural vestiges on the mesopleuron. Colour yellow to light brownish yellow, glossy.

Notes on the separation of *arnoldi* from its closest relatives are given under *altinode*. Arnold (1916: 233) says that he has only found this species running on the branches of an unidentified tree which had green bark, the bark being covered by 'a thin yellowish and parchment-like outer skin, which is also waxy.' He states that the colour of the ants matches the skin of the tree very closely so that they are difficult to detect even when moving.

Material examined

Zimbabwe: Matopo Hills (*G. Arnold*); Matopos, Bedze (*G. Arnold*).

Monomorium balathir sp. n.

Holotype worker. TL 2·3, HL 0·52, HW 0·39, CI 75, SL 0·38, SI 97, PW 0·26, AL 0·54.

Clypeal carinae widely divergent anteriorly. Prominent median portion of clypeus with its anterior margin concave. Anterior and lateral margins of median portion of clypeus separated by a pair of low, weakly projecting triangular prominences. Eyes relatively large, 0·31 × HW and with 7–8 ommatidia in the longest row. In full-face view the posterior margins of the eyes just in front of the midlength of the sides. In profile the maximum diameter of the eye much greater than the distance separating the anteriormost point of the eye from the closest point of the mandibular insertion. Head capsule in profile dorsoventrally flattened. With the head in full-face view the antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head very shallowly convex and the broad occipital margin with only the faintest trace of concavity in full-face view. Promesonotum in profile shallowly convex and sloping posteriorly to the narrow but conspicuously impressed metanotal groove. Metanotal cross-ribs short but sharply defined. Propodeal spiracle minute and pinhole-like. Petiole node in profile subconical, high and narrow and narrowly rounded above. Subpetiolar process a small elongate lobe. Postpetiole more broadly rounded above than petiole, the anterior face of its node almost vertical, the posterior face much more shallowly sloping. In dorsal view both nodes broader than long. Standing pilosity dense and conspicuous on all dorsal surfaces, the promesonotum with 8–9 pairs and those at the pronotal humeri and midlength of the promesonotum notably elongate. Sides of head both in front of and behind eyes with projecting suberect to subdecumbent hairs. Entire body smooth and shining, unsculptured except for scattered minute hair-pits and metanotal short cross-ribs. Colour glossy dark brown, the appendages dull yellow.

Paratype workers. TL 2·2–2·3, HL 0·50–0·52, HW 0·37–0·39, CI 73–76, SL 0·36–0·38, SI 95–97, PW 0·26, AL 0·54–0·55 (4 measured). As holotype but maximum diameter of eyes 0·30–0·32 × HW.

Subpetiolar process may be reduced to a low narrow ridge. Promesonotal dorsum with 8–10 pairs of standing hairs.

Holotype worker, **Burkina Faso** (U. Volta on label): Ougadougou, 6.ix.1970 (*P. Room*) (BMNH). Paratypes, 4 workers and 1 female with same data as holotype (BMNH; MCZ).

This dark coloured, large-eyed and conspicuously hairy species is a very distinctive member of the group. In colour and eye size it is approached only by the Kenyan *manir*, but this species is less densely pilose and has shorter scapes, SI 89 as compared with 95–97 in *balathir*. Two other large-eyed Afrotropical species are known in this group which have the maximum eye diameter greater than 0·30 × HW, *katir* and *holothir*. Both these are yellow in colour and *katir* has only 2–3 pairs of hairs on the promesonotum besides having very large eyes (0·35–0·38 × HW). *M. holothir* has slightly shorter scapes (SI 92–94) than *balathir*, besides being much ligher in colour and somewhat smaller.

Monomorium bequaerti Forel

(Fig. 92)

Monomorium (Martia) bequaerti Forel, 1913*a*: 334. Syntype workers, Zaire: Elizabethville, 20.iii.1912 (*Bequaert*) (MRAC, MHN) [examined].

Worker. TL 1·9, HL 0·50, HW 0·38, CI 76, SL 0·36, SI 95, PW 0·25, AL 0·54.

Clypeal carinae moderately strongly developed and widely divergent anteriorly. Maximum diameter of eye 0·21 × HW and with 5 ommatidia in the longest row. Outer ring of ommatidia enclosing more than one longitudinal row. In full-face view the eyes conspicuously in front of the midlength of the sides and the scapes, when laid straight back, failing to reach the occipital margin. Antennae with 11 segments. Sides of head evenly very shallowly convex in full-face view, the occipital margin exceptionally shallowly concave, almost transverse. Promesonotal dorsum in profile convex, sloping posteriorly to the shallow and only feebly impressed metanotal groove. Propodeum convex and broadly rounded, the spiracle pinhole-like. Nodes of petiole and postpetiole longer than broad in dorsal view. In profile the petiole node a high, relatively narrow, bluntly subconical structure. Subpetiolar process a narrow rim anteroventrally. Postpetiole in profile with a shallowly convex anterior face, broadly rounded dorsum and very long gradually sloping posterior face, the postpetiole relatively large, about the same size as or even slightly larger than the petiole. Except for small hair-pits, cross-ribbing at the metanotal groove and some faint vestiges on the pleurae sculpture is absent from the head and body; all surfaces except those mentioned being smooth and highly polished. All dorsal surfaces of head and body with standing hairs present, the promesonotum with 5 pairs. Colour a light glossy brown.

Of the Afrotropical species in which the antennae are 11-segmented three, *bequaerti*, *pulchrum* and *rosae*, have the relatively large and characteristically shaped postpetiole indicated in Fig. 92. Among these three species *rosae* is a fairly common West and Central African form which is very dark in colour, being blackish brown to black. The other two are much lighter, and apparently less common. *M. pulchrum* from Zimbabwe is dull yellow and *bequaerti* from Zaire is glossy light brown. Apart from its colour *bequaerti* is characterized by its relatively high narrow petiole node which in dorsal view is longer than broad. In both other species the petiole node is conspicuously broader than long in dorsal view.

Material examined

Zaire: Elizabethville (*Bequaert*).

Monomorium bevisi Arnold

Monomorium bevisi Arnold, 1944: 10, figs 16, 16a. Syntype workers, Lesotho: xii.1938 (*A. L. Bevis*) (SAM) [examined].

Worker. TL 2·4–2·6, HL 0·60–0·63, HW 0·48–0·50, CI 78–80, SL 0·48–0·50, SI 100–106, PW 0·28–0·32, AL 0·66–0·72 (6 measured).

Anterior clypeal margin with a median notch-like concavity between the apices of the clypeal carinae; the latter sharply defined and subparallel, only feebly divergent anteriorly. Clypeal margin at apices of carinae angulate but without projecting triangular teeth or denticles. Eyes of moderate size, maximum diameter 0·20–0·22 × HW and with 6–7 ommatidia in the longest row. The eyes positioned so that their

posterior margins are at the midlength of the sides in full-face view. Antennal scapes moderately long (SI 100 or more), when laid straight back from their insertions either reaching or only fractionally failing to reach the occipital margin. Sides of head almost straight in full-face view both in front of and behind the eyes; the sides curving towards the occipital corners. Promesonotal dorsum a low shallow convexity in profile, descending behind to the narrow and shallowly impressed metanotal groove. Cross-ribs of metanotal groove short and inconspicuous. Propodeal spiracle small, pinhole-like. Propodeal dorsum somewhat flattened but rounding evenly into the declivity. Petiole peduncle with a very low rounded anteroventral process. All dorsal surfaces of head and body with numerous standing hairs; more than eight pairs present on the promesonotum. Entirely lacking sculpture except for the cross-ribs of the metanotal groove and some faint indications on the metapleuron. Colour a dingy light brown throughout.

As Arnold (1944: 11) stated, this dingy brown species is related to *firmum* but has a much narrower metanotal groove which lacks the strong and conspicuous cross-ribs shown by *firmum*. Also the propodeal spiracle, which is large and dominates the side of the propodeum in *firmum*, is much smaller and pinhole-like in *bevisi*.

Material examined

Lesotho (*A. C. Bevis*).

Monomorium binatu sp. n.

(Fig. 78)

Holotype worker. TL 2·0, HL 0·53, HW 0·39, CI 74, SL 0·41, SI 105, PW 0·26, AL 0·56.

Clypeal carinae sharply defined, close together posteriorly and only weakly diverging anteriorly; subparallel anteriorly and running to the margin. Anterior clypeal margin between the carinal apices shallowly concave. Anterior and lateral margins of prominent median portion of clypeus confluent through a pair of broadly rounded angles, the two not separated by projecting sharp angles or denticles. Maximum diameter of eye 0·23 × HW and with 6 ommatidia in the longest row. In full-face view the posterior margins of the eyes conspicuously in front of the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, just reaching the occipital margin. Sides of head behind eyes feebly convergent posteriorly, the occipital margin broad and extremely shallowly concave, almost transverse. Promesonotum in profile evenly shallowly convex, descending posteriorly to the broadly and quite deeply impressed metanotal groove. Metanotal cross-ribs fine and only weakly developed. Propodeal outline rising steeply from the metanotal groove, the propodeal dorsum sloping downwards posteriorly and approximately flat, rounding smoothly but quite abruptly into the near-vertical declivity. Peduncle of petiole elongate and subtended by a conspicuous anteroventral process in the form of a flange-like cuticular strip. Petiole node in profile high and subconical, narrowly rounded above. Anterior face of petiole node longer and less strongly sloping than posterior face so that the node is slightly inclined posteriorly. Postpetiole node lower and much more broadly rounded than that of the petiole. Standing hairs present on all dorsal surfaces but relatively sparse, the promesonotum with only 3 pairs. Sculpture absent except for scattered minute hair-pits and the faint metanotal cross-ribs. Colour yellow, the gaster slightly darker in shade than the head and alitrunk.

Paratype workers. TL 1·9–2·0, HL 0·48–0·53, HW 0·37–0·39, CI 73–76, SL 0·36–0·41, SI 100–105, PW 0·24–0·26, AL 0·52–0·56 (8 measured). Maximum diameter of eye 0·21–0·23 × HW and with 5–6 ommatidia in longest row. The mesopleuron may have a faint band of vestigial sculpture running transversely at about the mid-length. In one worker the petiole node is almost upright, not inclined posteriorly as in the rest.

Holotype worker, **Zimbabwe** (Rhodesia on label): Vumba Mts, nr Umtali, 11.iii.1969 (*W. L. Brown*) (MCZ).

Paratypes. 16 workers with same data as holotype (MCZ; BMNH).

Closely related to *rhopalocerum*, *symmotu* and *exchao*, *M. binatu* separates from all of these by its possession of relatively long scapes and high inclined petiole node. The SI of *binatu* (100–105) contrasts to the combined SI 83–94 of the other three species and the node (Fig. 78) is very different in shape from those shown by its close relatives (Figs 77, 79, 81). The shape of the node is approached most closely by *tablense* (Fig. 80) but here the scapes fail to reach the occipital margin, the promesonotum is more strongly convex,

the metanotal groove not so broadly impressed and the eyes are larger. Apart from this the petiole node in *tablense* is narrower than in *binatu* and has its anterior face somewhat concave in profile (Fig. 80).

Monomorium boerorum Forel **stat. n.**

(Figs 63, 91)

Monomorium minutum var. *boerorum* Forel, 1910b: 442. Syntype workers, female, SOUTH AFRICA: Orange Free State, vii.6. (*Wroughton*) (MHN; BMNH) [examined].

WORKER. TL 1·9–2·0, HL 0·50–0·54, HW 0·38–0·43, CI 76–80, SL 0·33–0·34, SI 80–86, PW 0·24–0·25, AL 0·54–0·56 (3 measured).

Clypeal carinae feebly developed, visible posteriorly, divergent and fading out anteriorly. Prominent median portion of clypeus more or less evenly broadly convex across its entire width, its border not differentiated into anterior and lateral margins by a pair of angles or denticles. Maximum diameter of eye 0·19–0·21 × HW and with 6 ommatidia in the longest row. With the head in full-face view the posterior margins of the eyes conspicuously in front of the midlength of the sides and the scapes, when laid straight back from their insertions, falling far short of the occipital margin. Head with sides shallowly convex in full-face view and broadening posteriorly to the beginning of the curve of the occipital corner. Occipital margin broad and very shallowly transversely concave. Promesonotum shallowly convex in profile, sloping posteriorly to the weakly impressed metanotal groove; the latter with short but distinct cross-ribs. Propodeal dorsum evenly convex, the spiracle small. Petiole node low and thickly subconical, bluntly rounded above. Anterior peduncle of petiole short and stout, with a flange-like anteroventral process. Postpetiole much smaller than petiole, more broadly rounded above. All dorsal surfaces of body with standing hairs, 3–4 pairs present on promesonotum. Lower half of mesopleuron reticulate and metanotum cross-ribbed, otherwise entire body without sculpture except for hair-pits. Body glossy brown.

M. boerorum was originally described as a variety of the European *minutum* (=*monomorium*), a species to which it is not at all closely related. The true affinities of *boerorum* are difficult to discern as it possesses a petiole and postpetiole structure similar to that of *paternum* and *nuptuale* but lacks their clypeal structure. It lacks the much enlarged propodeal spiracle characteristic of *kelapre* but apart from this the overall similarity with *kelapre* is striking.

MATERIAL EXAMINED

South Africa: Orange Free State (*Wroughton*).

Monomorium borlei Santschi **stat. n.**

Monomorium (Monomorium) springvalense var. *borlei* Santschi, 1937: 225, figs 22–24. Syntype workers, ANGOLA: Sangévé, 1932–33, no. 110 (*A. Monard*) (NMB) [examined].

WORKER. TL 1·9–2·0, HL 0·50–0·52, HW 0·40–0·41, CI 79–80, SL 0·36–0·38, SI 90–93, PW 0·25–0·26, AL 0·54–0·56 (2 measured).

Median portion of clypeus sharply prominent anteriorly, the anterior and lateral borders of the prominence separated by obtuse but sharp angles and the anterior margin between the angles shallowly concave. Clypeal carinae moderately sharply defined, widely divergent anteriorly. Maximum diameter of eyes 0·22–0·24 × HW and with 7 ommatidia in the longest row. With the head in full-face view the eyes in front of the midlength of the sides and the antennal scapes, when laid straight back, failing to reach the occipital margin. In full-face view the sides of the head very feebly convex, the occipital margin broad and transverse to extremely shallowly concave. Promesonotum in profile convex anteriorly, the mesonotum posteriorly almost flat and sloping evenly to the narrow but distinctly impressed metanotal groove. Propodeal dorsum behind the metanotal groove following the same slope as the mesonotum; rounding broadly into the declivity. Propodeal spiracle large and dominating the side of the sclerite. Petiole with a low flange-like ventral process, the node bluntly subconical. Node of postpetiole lower than that of petiole, broader and more broadly rounded above. In dorsal view both nodes conspicuously broader than long. Standing hairs sparsely present on all dorsal surfaces of head and body; the promesonotum with 3 pairs, propodeum with 1 pair, petiole and postpetiole each with 1 pair. Almost entirely smooth and unsculptured except for hair-pits; the metanotal groove with short but sharply defined cross-ribs and the mesopleuron with a transverse strip of vestigial sculpture. Colour a uniform glossy dark brown.

Related to *leopoldinum* but differentiated by its longer scapes and much sparser pilosity, *borlei* is known only from the type-series. Originally described as a variety of *springvalense*, *borlei* is very close indeed to that species but is darker in colour, has a larger propodeal spiracle and 3 pairs of standing hairs on the promesonotum.

MATERIAL EXAMINED
Angola: Sangévé (*A. Monard*).

Monomorium braunsi Mayr

Monomorium braunsi Mayr, 1901: 7. Syntype worker, SOUTH AFRICA: Port Elizabeth (*H. Brauns*) (BMNH) [examined].

WORKER. TL 1·6, HL 0·43, HW 0·33, CI 77, SL 0·27, SI 82, PW 0·20, AL 0·44.
Clypeal carinae of this minute species short, clearly visible only on central third of length of median portion of clypeus, fading out both anteriorly towards the free margin and posteriorly between the antennal insertions. Anterior clypeal margin evenly convex across central portion, without conspicuous angles or denticles separating the anterior and lateral borders of the median prominent section of the clypeus. Eyes relatively small, only 0·18 × HW and with 5 ommatidia in the longest row. In full-face view the eyes very distinctly in front of the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, falling far short of the occipital margin. Sides of head very shallowly convex in full-face view and divergent posteriorly from front to back so that the width across the occiput is obviously greater than the width across the clypeus. Occipital margin nearly transverse, with only the feeblest hint of concavity medially. Head in profile dorsoventrally compressed, the ventral surface more convex than the dorsal. Promesonotum low and only weakly convex in profile, the metanotal groove very shallowly impressed and traversed by short cross-ribs. Propodeal dorsum shallowly convex and rounding broadly into the declivity. Propodeal spiracle minute and pinhole-like. Petiole with a short stout anterior peduncle, the latter with a small inconspicuous anteroventral process. Node of petiole low and broad in profile, broadly rounded above and with a bulging convex ventral border. Postpetiole smaller and lower than the petiole, its dorsal surface somewhat more broadly rounded. Cephalic dorsum with several pairs of standing hairs but alitrunk with only a single pair, situated at the pronotal humeri. Petiole, postpetiole and gaster all with standing hairs visible. Sculpture absent except for minute hair-pits and metanotal cross-ribs. Colour uniformly yellow.

This minute yellow species is distinguished from its close relatives *mavide*, *musicum* and *torvicte* by its very reduced alitrunk pilosity and low broadly rounded petiole node. The subpetiolar process of *braunsi* is very reduced, being represented only by a low anteroventral prominence rather than the anteriorly truncated longitudinal cuticular strip seen in the other three species mentioned.

MATERIAL EXAMINED
South Africa: Port Elizabeth (*H. Brauns*).

Monomorium captator Santschi

Monomorium captator Santschi, 1932: 385, fig. 8 (without description). [Nomen nudum.]
Monomorium (Monomorium) captator Santschi, 1936: 43. Holotype worker, ZAIRE: Ronga (NMB) [examined].

WORKER. TL 1·8–1·9, HL 0·52–0·54, HW 0·41–0·42, CI 77–81, SL 0·36–0·38, SI 88–93, PW 0·26–0·28, AL 0·53–0·55 (5 measured).
Clypeal carinae sharply developed, widely separated and divergent anteriorly, terminating at the anterior clypeal margin in a pair of low triangular prominences or denticles. Anterior margin of projecting median portion of clypeus concave between these triangular prominences and usually with an indentation at the site of the median setal socket. Maximum diameter of eye 0·24–0·26 × HW and with 6–7 ommatidia in the longest row. With the head in full-face view the eyes in front of the midlength of the sides and the scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head in full-face view evenly shallowly convex, the occipital margin broad and transverse to broadly and very shallowly concave. Alitrunk in profile with the promesonotum shallowly convex anteriorly and evenly sloping posteriorly to the weakly impressed metanotal groove. Cross-ribs of metanotal groove well developed but mostly only short; a few longer cross-ribs occur laterally, about at the level of the propodeal

spiracle. Propodeal dorsum in profile with a very short convex area immediately behind the metanotal groove, the remainder of the surface more or less flat and sloping posteriorly. Dorsum and declivity of propodeum meeting in a broad curve. Propodeal spiracle large, larger than is usually seen in relatives of *altinode* (Figs 85–88) but smaller than that seen in such as *kineti* (Fig. 64). Petiole node in profile high and narrow, anteroposteriorly compressed and narrowly rounded above. Postpetiole more broadly rounded above and somewhat lower than the petiole, but with a conspicuous vertical anterior face. All dorsal surfaces of head and body with numerous standing hairs; the promesonotum with more than 8 pairs. Head and body unsculptured except for hair-pits, metanotal cross-ribs and some faint vestiges of sculpture on the lower mesopleuron. Colour glossy dull yellow, the head slightly darker in shade than the alitrunk.

Among the immediate relatives of *altinode* and *arnoldi* are those species in which the petiole node is high, narrowly rounded and anteroposteriorly compressed, the postpetiole high and with a vertical anterior face, and the colour yellow (Figs 84–88). *M. captator* is distinguished among these forms by its relatively large propodeal spiracle and dense alitrunk pilosity. A comparison of critical measurements between *captator* and its closest relatives can be obtained from the dimensions given above and the table presented in the discussion of *altinode*.

MATERIAL EXAMINED

Gabon: Libreville (*F. Brunck*). **Zaire**: Ronga.

Monomorium crawleyi Santschi

(Fig. 69)

Monomorium (Monomorium) crawleyi Santschi, 1930*a*: 66. Syntype workers, ETHIOPIA: Djem-Djem Forest, 8000 ft (2400 m) 26.ix.1926 (*H. Scott*) (BMNH; MCZ) [examined].

WORKER. TL 2·3–2·4, HL 0·57–0·59, HW 0·45–0·47, CI 78–81, SL 0·45–0·46, SI 98–102, PW 0·28–0·29, AL 0·64–0·68 (12 measured).

Anterior margin of prominent median portion of clypeus transverse to shallowly concave; the anterior and lateral margins of the prominent portion separated by obtuse angles, without projecting denticles or projecting sharp angles. Clypeal carinae sharply developed, subparallel, only very feebly divergent anteriorly and running to the anterior clypeal margin. Maximum diameter of eye 0·21–0·24 × HW and with 6–7 ommatidia in the longest row. With the head in full-face view the posterior margins of the eyes at or very close to the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, just reaching the occipital margin. Sides of head behind eyes shallowly convex and somewhat convergent posteriorly in full-face view, the occipital margin with a short and shallow median indentation. Promesonotal outline in profile a shallow low even convexity, the extreme posterior portion of the mesonotum suddenly more steeply sloping. Metanotal groove a very broad shallow U-shaped identation. Propodeal dorsum and declivity behind the metanotal groove forming a single smoothly curved convexity. Propodeal spiracle large and conspicuous. Petiole node low and bluntly subconical in profile, the anteroventral process of the elongate peduncle with a small lobiform anterior section and a narrow strip-like posterior tail which reaches back to the level of the petiolar spiracle. Postpetiole much smaller than the petiole, lower and more broadly rounded. All dorsal surfaces of head and body with standing hairs present, the promesonotum with 5–6 pairs. Entirety of head unsculptured except for minute hair-pits. Alitrunk unsculptured except for long conspicuous metanotal cross-ribs and some faint reticulation on the mesopleuron. Colour yellow, the cephalic dorsum and posterior portion of the gaster darker.

The distinctive shape of the alitrunk and relatively large propodeal spiracle render this Ethiopian species easily recognizable. Its closest known relative appears to be *arboreum* but here the alitrunk is differently shaped, compare Figs 65, 69.

MATERIAL EXAMINED

Ethiopia: Djem-Djem Forest (*H. Scott*).

Monomorium disoriente **sp. n.**

(Fig. 83)

HOLOTYPE WORKER. TL 1·8, HL 0·46, HW 0·37, CI 80, SL 0·34, SI 92, PW 0·23, AL 0·52.

Projecting median portion of clypeus with a broad, more or less transverse anterior margin which is

separated from the lateral margins only by bluntly rounded angles, without trace of projecting denticles or prominences. Clypeal carinae widely separated and divergent anteriorly, reaching the anterior clypeal margin. Maximum diameter of eye 0·24 × HW and with 6–7 ommatidia in the longest row. With the head in full-face view the eyes only fractionally in front of the midlength of the sides and the antennal scapes, when laid straight back from their insertions, just failing to reach the occipital margin. Sides of head shallowly convex in full-face view, the occipital margin broad and almost transverse, only with a very small central indentation. Promesonotum in profile evenly convex, highest at about the midlength; the promesonotum much higher than the propodeum. Mesonotum sloping posteriorly to the broadly but shallowly impressed metanotal groove, the latter traversed by long strong cross-ribs. Propodeum highest immediately behind the metanotal groove, the surface behind this approximately flat and sloping posteriorly. Propodeal spiracle small. Petiole with a short anterior peduncle which is subtended by a conspicuous lamellate ventral process. Petiole node high and bluntly subconical in profile. Postpetiole in profile with a steep anterior face and much more gently sloping posterior surface. Standing hairs present on all dorsal surfaces of head and body, the promesonotum with 4–5 pairs. Head and body unsculptured except for hair-pits, strong metanotal cross-ribs and fine reticulate-punctation on the upper half of the mesopleuron behind the pronotal laterotergite. Colour glossy pale brown, the gaster slightly darker in shade than the head and alitrunk.

Holotype worker, **Tanzania** ('Afr.Or.all'): Bezirk-Bukoba, Buk. 26 (*Viehmeyer*) (NMB).

The holotype of *disoriente* was originally mounted on the same pin as the lectotype of *strangulatum*. The two are distinctly different species as the latter has only 11 antennal segments (12 in *disoriente*) and has small clypeal denticles present, among other features. Santschi's (1921*b*) original description appears to refer only to the specimen now treated as lectotype of *strangulatum*, so the second specimen on the mount has been remounted and now constitutes the holotype of *disoriente*.

The affinities of *disoriente* appear to lie with *affabile*, *tanysum* and their allies. For notes see under *tanysum*.

Monomorium dolatu sp. n.

Holotype worker. TL 1·5, HL 0·40, HW 0·34, CI 85, SL 0·26, SI 76, PW 0·22, AL 0·43.

Clypeal carinae sharply defined and only very weakly divergent anteriorly, the space between them feebly transversely concave and the carinae with the anterior clypeal margin extremely shallowly concave between their apices. Prominent median portion of clypeus strongly defined, its anterior and lateral margins meeting in sharp angles. The clypeal carinae terminate mesad of these angles and a small secondary carina or rugule arises at each angle and runs back towards the antennal socket, roughly paralleling the clypeal carina on each side. Maximum diameter of eye 0·21 × HW and with 5 ommatidia in the longest row. In full-face view the eyes in front of the midlength of the sides. Antennae with 11 segments; the scapes, when laid straight back from their insertions, failing to reach the occipital margin. Outline of dorsal promesonotum in profile evenly rounded-convex, the metanotal groove narrow but distinctly impressed. Metanotal cross-ribs short but strongly developed and conspicuous. Propodeal spiracle small. Propodeal dorsum in profile highest immediately behind the metanotal groove then sloping steeply to its rounded junction with the declivity. Peduncle of petiole very short and stout in profile, subtended by a deep anteroventral process which runs back approximately to the level of the petiolar spiracle where it is confluent with the strongly convex posteroventral margin of the node. Petiole node high and narrow, wedge-shaped in profile and narrowly rounded above. Postpetiole smaller than petiole, with a vertical anterior face, more broadly rounded dorsum and sloping posterior face. All dorsal surfaces of head and body with standing hairs, those of the alitrunk and gaster relatively short and appearing blunt or truncated apically; promesonotum with 5–6 pairs of standing hairs. Sculpture absent except for metanotal cross-ribs and some weak reticulation on the mesopleuron. Colour yellow, the head posteriorly somewhat darker than the alitrunk; first gastral tergite traversed apically by a broad brown band.

Paratype workers. TL 1·4–1·5, HL 0·38–0·40, HW 0·32–0·40, CI 84–87, SL 0·26–0·27, SI 76–81, PW 0·22–0·23, AL 0·42–0·44 (3 measured). Maximum diameter of eye 0·19–0·21 × HW. Otherwise as holotype.

Holotype worker, **Cameroun**: Nkoemvon, 1980, no. 11b (*D. Jackson*) (BMNH).
Paratypes. 3 workers with same data as holotype (BMNH; MCZ).
Non-paratypic material examined. **Ghana**: Mampong (*P. Room*). **Ivory Coast**: Gagno (*L. Brader*).

The non-paratypic material, one specimen from each locality, resembles the type-series very closely but the brown band across the first gastral tergite is paler and interrupted medially.

The affinities of *dolatu* lie with the members of the *malatu*-complex, despite its 11-segmented antennae. This is the only known Afrotropical species with 11 antennal segments which has the petiole and clypeus structured as described above, and is hence quite distinctive.

Monomorium draxocum sp. n.

HOLOTYPE WORKER. TL 1·8, HL 0·41, HW 0·34, CI 83, SL 0·36, SI 106, PW 0·22, AL 0·46.

Clypeal carinae sharply developed, widely separated and subparallel, only very feebly divergent anteriorly and reaching the anterior clypeal margin. Prominent median portion of clypeus with its anterior margin sharply defined and very feebly concave between the apices of the carinae, the anterior and lateral margins of the prominence meeting in an obtuse angle but without projecting denticles. Maximum diameter of eye 0·23 × HW and with 5 ommatidia in the longest row. In full-face view the eyes situated close to the midlength of the side of the head. Antennal scapes, when laid straight back from their insertions, slightly exceeding the occipital margin. Sides of head behind eyes shallowly convex and rounding broadly into the weakly convex occipital margin. In profile both the dorsal and ventral surfaces of the head markedly convex (shape very similar to *gabrielense*, Fig. 76). Promesonotal dorsal outline high and domed-convex in profile, on a very much higher level than the propodeal dorsum. Mesonotum descending steeply posteriorly to the broadly but shallowly impressed metanotal groove. Metanotal cross-ribs conspicuous dorsally, but laterally becoming confused with the strong mesopleural sculpture. Propodeal dorsum evenly convex in profile, rounding broadly into the declivity. Petiole node subconical, tapering and narrowly rounded dorsally. Anterior peduncle relatively long and subtended by a ridge-like ventral process which is expanded into a small lobe anteriorly. Postpetiole node smaller than petiole, with a steep anterior face but more broadly rounded above than the petiole node. All dorsal surfaces of head and body with stout conspicuous standing hairs, the promesonotum with 4 pairs. Scattered hair-pits present on head and body, metanotal cross-ribs conspicuous, and the mesopleuron strongly reticulate-punctate; sculpture otherwise absent. Head and alitrunk dark brown, gaster black. Legs conspicuously much lighter than alitrunk, tending to be very pale yellow or almost colourless.

PARATYPE WORKERS. TL 1·7–1·9, HL 0·39–0·42, HW 0·32–0·35, CI 79–83, SL 0·32–0·36, SI 100–109, PW 0·22–0·23, AL 0·44–0·46 (8 measured). As holotype but maximum diameter of eye 0·21–0·24 × HW and with 5–6 ommatidia in longest row. With 4–5 pairs of standing hairs on the promesonotum.

Holotype worker, **Cameroun**: Nkoemvon, 25.xi.1980, no. N52 (*D. Jackson*) (BMNH).

Paratypes. 5 workers with same data as holotype, and 3 workers with same locality but 6.x.1980, no. N34 (BMNH; MCZ).

Non-paratypic material examined. **Cameroun**: Buea (*B. Malkin*). **Gabon**: Plateau d'Ipassa (*J. A. Barra*). **Angola**: Dundo, Carrisso Pk (*L. de Carvalho*).

A conspicuous species characterized within the group with *noxitum*, *gabrielense* and *strangulatum* by the form of the clypeus, position of the eyes, length of the scapes, biconvexity of the head and strongly domed promesonotum. Also diagnostic of this small complex of species is the relatively long petiolar peduncel and subconical node, as illustrated in *gabrielense* (Fig. 76).

Of these four species *strangulatum* has only 11 antennal segments, and *gabrielense* is small and lightly coloured. *M. draxocum* and *noxitum* are very closely related and may prove inseparable when more material had been amassed. Characters separating them in presently available material are listed under *noxitum*.

Monomorium egens Forel

(Figs 71, 82)

Monomorium egens Forel, 1910b: 443. Holotype worker, CAMEROUN (*Muralt*) (MHN) [examined].

Monomorium jucundum Santschi, 1926*a*: 232. Syntype workers, ZAIRE: Luebo 16.xii.1921 (*H. Schouteden*) (MRAC; NMB) [examined]. **Syn. n.**

Monomorium longiusculum Santschi, 1926*a*: 237, fig. 3G. Holotype worker, ZAIRE: Lukuga supérieur (*Gérard*) (NMB) [examined]. **Syn. n.**

WORKER. TL 2·0–2·5, HL 0·46–0·64, HW 0·39–0·54, CI 79–89, SL 0·33–0·47, SI 80–96, PW 0·24–0·30, AL 0·54–0·70 (28 measured).

Clypeal carinae moderately strongly developed, divergent anteriorly. Prominent median portion of clypeus relatively short, its anterior margin sometimes only shallowly concave but usually showing an extensive concavity. Angles where anterior and lateral margins of median section of clypeus meet lacking denticles or prominent angles. Maximum diameter of eye 0·19–0·21 × HW, the relatively small eyes with their posterior margins at or just in front of the midlength of the sides when seen in full-face view. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. In full-face view the sides of the head distinctly convex, the occipital margin broadly but shallowly concave. Pronotum almost or quite flat transversely when viewed from behind and slightly above. The humeral corners in this view conspicuous and distinctly angular, rather than broadly evenly rounded, and the dorsum of the pronotum separated from the sides by bluntly angular longitudinal marginations. In profile the pronotum flat to shallowly convex, sloping upwards posteriorly. The mesonotum convex and sloping posteriorly to the narrow but conspicuously impressed metanotal groove; the latter with short cross-ribs. Propodeal spiracle minute and pinhole-like, the dorsum of the segment shallowly convex in profile. Petiole node in profile bluntly subconical, with an inconspicuous narrow strip-like ventral process. Postpetiole smaller than petiole, lower and more broadly rounded. All dorsal surfaces of head and alitrunk with numerous standing hairs, the antennal scapes with long fine erect to suberect hairs. Head and body smooth and without sculpture except for minute hair-pits, metanotal cross-ribs and frequently (but not always) a narrow transverse reticulate band across the mesopleuron. Colour brown to blackish brown.

This species, as presently constituted, is widely distributed in West and Central Africa and is quickly diagnosed by the construction of the pronotum, minute spiracle, small eyes and densely hairy scapes. This combination of characters, together with the others given above, lead me to treat all the samples listed below as members of a single species, but I am not truly convinced that this is correct. In some short series from Cameroun and Ghana the clypeus is much more shallowly concave than is usual, that is, as in Fig. 71, and also in the Cameroun series the propodeum is more strongly convex in profile. A single worker, also from Cameroun, has the head and gaster much darker in colour than the alitrunk, with colours reminiscent of *floricola*. Here again the anterior clypeal margin is almost transverse, much less concave than in *egens* holotype and most other samples, although the colours may indicate a teneral individual. Degree of convexity of the sides of the head varies from sample to sample and the petiole node in some is slightly inclined forward. Further study of *egens*, as it is presently understood, will be essential when more samples and especially longer series are available, and may lead to the recognition of two or even more species here.

Usually *egens* nest in rotten wood in the soil or in fallen trunks, and forages in the wood and the surrounding leaf litter. More rarely the ants nest in rotten parts of standing trees, some distance above the ground.

Two closely related but distinctly different species occur in Cameroun, *draxocum* and *noxitum*. These have not been found anywhere else in West or Central Africa and both lack the characteristic pronotal structure of *egens*. A rather more distant relative is *strangulatum*, known from Uganda and Tanzania, in which the number of antennal segments has been reduced from 12 to 11.

Material examined

Ivory Coast: Banco Forest, nr Abidjan (*W. L. Brown*). **Ghana**: Atewa (*D. Leston*); Bunso (*D. Leston*); Asamankese (*D. Leston*); Enchi (*D. Leston*); Adeiso (*D. Leston*); Mepom (*D. Leston*); Legon (*D. Leston*); Aburi (*P. Room*); Afwerase (*P. Room*); Tafo (*B. Bolton*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*). **Cameroun**: no loc. (*Muralt*); Nkoemvon (several short series) (*D. Jackson*). **Zaire**: Luebo (*H. Schouteden*); Upper Lukuga (*Gérard*); Ituri Forest, Beni-Irumu (*N. A. Weber*). **Angola**: R. Chissanguiri (*L. de Carvalho*); Dundo, Carrisso Pk (no name).

Monomorium excensurae Forel **stat. n.**

(Figs 61, 75)

Monomorium oscaris var. *excensurae* Forel, 1915: 342. Syntype workers, South Africa: Cape Prov., Kentani (*A. Pegler*) (MHN) [examined].

Worker. TL 1·9–2·2, HL 0·50–0·58, HW 0·38–0·45, CI 76–79, SL 0·40–0·48, SI 104–110, PW 0·26–0·29, AL 0·50–0·64 (10 measured).

Clypeal carinae close together, subparallel, usually very weakly divergent anteriorly but in some the carinae weakly bowed outwards to their midlengths then curving in again anteriorly. Prominent median portion of clypeus narrow, its anterior margin transverse to concave between the apices of the carinae and lacking denticles or sharp angles at the junction of its anterior and lateral margins. Maximum diameter of

eye 0·20–0·23 × HW and with 5–6 ommatidia in the longest row. In full-face view the posterior margins of the eyes at the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, just reaching or fractionally surpassing the occipital margin. Sides of head in full-face view evenly convex, broadest at level of hind margins of eyes; occipital margin very shallowly concave. Promesonotum in profile quite shallowly evenly convex, the highest point in front of the promesonotal midlength and on a higher level than the highest point of the propodeum. Metanotal groove impressed but narrow and traversed by short inconspicuous cross-ribs. Propodeal spiracle minute and pinhole-like. Petiole with a narrow anterior peduncle in profile, the subpetiolar process a small anteroventral lobe which varies in shape and size. Petiole node subconical, the anterior face much longer and more shallowly sloping than the posterior. Postpetiole node smaller, lower and more broadly rounded than the petiole. All dorsal surfaces of head and body with standing hairs, the promesonotum with 4 or 5 pairs. Body and head entirely lacking sculpture except for minute hair-pits and metanotal weak cross-ribs. Colour uniform yellow.

M. excensurae belongs to the *schultzei*-complex and is closely related to *bevisi* and *schultzei* itself, the three species possessing a minute and pinhole-like propodeal spiracle. Of the three *bevisi* is dingy brown in colour and conspicuously more densely hairy than *schultzei* or *excensurae*, both of which are yellow. These last two are very closely related and are best separated by the slightly larger eyes and shorter scapes of *schultzei*. Apart from this the outline shape of the eye is more nearly round in *excensurae*, whereas in *schultzei* the longitudinal axis of the eye is more obviously longer than the vertical axis. The clypeal carinae of *schultzei* are more strongly developed and the area of clypeus between them more deeply concave, and the dorsum of the petiole node in dorsal view is more anteroposteriorly compressed in *schultzei*.

MATERIAL EXAMINED

South Africa: Cape Prov., Kentani (*A. Pegler*); Grahamstown, Beggar's Bush (*W. L. Brown*).

Monomorium exchao Santschi

(Figs 70, 77)

Monomorium exchao Santschi, 1926*a*: 235. Syntype workers, SOUTH AFRICA: Cape Prov., Grahamstown, Paradise Kloof, xii.1919 (*J. Hewitt*) (NMB) [examined].

WORKER. TL 1·9–2·0, HL 0·49–0·50, HW 0·37–0·38, CI 74–77, SL 0·33–0·34, SI 89–91, PW 0·24–0·25, AL 0·52–0·54 (3 measured).

Clypeal carinae strongly developed and sharp, subparallel or only feebly divergent anteriorly. Apices of clypeal carinae meeting anterior border of clypeus mesad of the anterolateral angles of the prominent median section of the clypeus, not running to the angles themselves. Prominent median portion of clypeus with its anterior margin transverse to concave between the apices of the carinae; outside the carinae on each side the anterior margin meeting the lateral margin of the prominent section in an obtuse but conspicuous angle. Maximum diameter of eye 0·20–0·21 × HW and with 4–5 ommatidia in the longest row. In full-face view the eyes with their posterior margins distinctly in front of the midlength of the side, and the antennal scapes, when laid straight back, failing to reach the occipital margin. Sides of head shallowly convex in full-face view, the occipital margin relatively short and more or less transverse, only with the feeblest concavity across its width. Promesonotum in profile low, shallowly and evenly convex. Metanotal groove strongly impressed and conspicuous, the propodeum behind the groove convex and then sloping backwards to round broadly and evenly into the declivity so that the two surfaces form a single convexity. Petiole in profile bluntly conical, postpetiole smaller than petiole and rounded. All dorsal surfaces of head and body with standing hairs present, the promesonotum apparently with 4 pairs but all the syntypes appear abraded and the total count may in fact be higher. Body entirely unsculptured except for hair-pits and cross-ribs at the metanotal groove. Colour uniform yellow.

M. exchao is closest related to *symmotu*, but the two are separable by the shape of the petiole in profile and the more broadly rounded outline of the propodeum in *symmotu*, compare Figs 77, 79.

MATERIAL EXAMINED

South Africa: Grahamstown, Paradise Kloof (*J. Hewitt*); E. Cape Prov., Hogsback (*W. L. Brown*).

Monomorium exiguum Forel

Monomorium exiguum Forel, 1894*a*: 85. Syntype workers, Ethiopia: 'Südabessinien' (*Ilg*) (MHN) [examined].

Monomorium (Mitara) exiguum var. *bulawayensis* Forel, 1913*c*: 217. Syntype workers, Zimbabwe: Bulawayo, 20.vii.1913, no. 179 (*G. Arnold*) (BMNH; MHN; MCZ) [examined]. **Syn. n.**

Monomorium (Mitara) faurei Santschi, 1915: 260, fig. 10. Syntype workers, Gabon: Samkita (*Faure*) (NMB; MRAC) [examined]. **Syn. n.** (provisional).

Monomorium (Mitara) exiguum r. *flavescens* Forel, 1916: 418. Syntype workers, Zaire: St Gabriel (*Kohl*) (MHN) [examined]. **Syn. n.** (provisional).

Worker. TL 1·5–1·7, HL 0·36–0·42, HW 0·28–0·32, CI 74–80, SL 0·22–0·27, SI 74–84, PW 0·17–0·21, AL 0·36–0·44 (40 measured).

Clypeal carinae present but quite weakly developed, widely separated and distinctly divergent anteriorly and with a tendency to peter out before reaching the anterior clypeal margin. Median portion of clypeus prominent but lacking sharp angles or denticles where its anterior and lateral margins meet. Maximum diameter of eye 0·19–0·22 × HW. Eyes in profile consisting of an outer ring of ommatidia which encloses a single longitudinal row of only 2–3 ommatidia; rarely with another one or two ommatidia within the ring. In full-face view the eyes conspicuously in front of the midlength of the sides. Antennae with 11 segments. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Promesonotum shallowly convex in profile, the metanotal groove shallowly impressed but with distinct short cross-ribs. Propodeal dorsum and declivity forming a single rounded convexity; propodeal spiracle minute and pinhole-like. Petiolar peduncle short and stout, with a small anteroventral process. Node of petiole low-subconical in profile, broad basally and tapering rapidly to a narrow but bluntly rounded apex. Postpetiole smaller than petiole, lower and much more broadly convex dorsally. All dorsal surfaces of body with standing hairs, the pronotum with a pair on the anterior margin between the humeral pair. In total the promesonotum usually with 4 pairs of standing hairs but sometimes a fifth pair may be present. Entirely lacking sculpture except for the metanotal cross-ribs, or rarely with some faint shagreening on the mesopleuron. Colour very variable, from clear yellow to uniform dark brown, frequently with a pair of darker patches or a darker band apically on the first gastral tergite.

Without doubt the name *exiguum*, as presently constituted, conceals more than one valid species, but a very detailed analysis of much more material than is currently available will be necessary to split up the mass. Particularly interesting is the occurrence of both alate and apterous females among the Ghanaian samples listed below. Almost certainly this indicates that two species are present in Ghana and workers associated with the apterous females closely match the type-series of *flavescens*. Unfortunately females from the rest of the range are utterly unknown so no comparisons can be accurately made.

The species closest to *exiguum* as defined here is *vaguum*, but this is easily distinguished by the presence in the latter of a conspicuous clump of 4 or more pairs of hairs on the pronotum.

Material examined

Ivory Coast: 40 km W. Abidjan (*W. L. Brown*). **Ghana**: Kibi (*D. Leston*); Mampong (*P. Room*); Boku (*C. A. Collingwood*); Pankese (*C. A. Collingwood*); Legon (*D. Leston*); Tafo (*B. Bolton*); Tumu (*P. Room*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*). **Cameroun**: Nkoemvon (*D. Jackson*). **Gabon**: Samkita (*Faure*). **Zaire**: St Gabriel (*Kohl*). **Ethiopia**: 'Sudabessinien' (*Ilg*). **Kenya**: Tana R., Kora (*Collins & Ritchie*). **Zimbabwe**: Bulawayo (*G. Arnold*); Sawmills (*G. Arnold*), Victoria Falls (*G. Arnold*).

Monomorium fasciatum Santschi nomen dubium

Monomorium fasciatum Santschi, 1920*b*: 10, figs 1c–e. Holotype worker, Kenya: Kilimanjaro (*Reichensperger*) (NMB) [not seen].

Dr Cesare Baroni Urbani (NMB) informs me that only the gaster of the holotype worker remains on the mount. From Santschi's original description and figures *fasciatum* undoubtedly belongs to the *schultzei*-complex and further belongs with those members of the complex in which the propodeal spiracle is relatively large. In East Africa these include *arboreum*, *crawleyi* and *kineti*. However, none of these three match Santschi's description and figures sufficiently well to confirm an identity, and *fasciatum* must remain as a nomen dubium.

Monomorium fastidium sp. n.

HOLOTYPE WORKER. TL 1·4, HL 0·42, HW 0·33, CI 79, SL 0·27, SI 82, PW 0·20, AL 0·42.

Clypeal carinae distinctly developed, divergent anteriorly, reaching the anterior margin but not terminating in denticles or angular projections. In full-face view the median portion of the clypeus prominent and the anterior border of the prominence more or less transverse. Maximum diameter of eye 0·21 × HW. In profile the eye longer than high and consisting of an outer ring of ommatidia enclosing a single longitudinal row of only 3 ommatidia. In full-face view the eye conspicuously in front of the midlength of the sides of the head. Antennae with 11 segments. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Head capsule in full-face view broadest posteriorly, the sides evenly and gradually narrowing anteriorly and the eyes situated in front of the broadest part of the head. In profile the ventral surface of the head convex, the convexity only shallow but noticeably greater than the convexity of the cephalic dorsum immediately behind eye-level. Promesonotum in profile not strongly convex, sloping very shallowly to the distinctly impressed and relatively broad metanotal groove; the latter with conspicuous cross-ribs. Propodeum highest immediately behind the metanotal groove then falling away posteriorly in an even, smoothly convex curve, without differentiation into dorsum and declivity. Propodeal spiracle minute and pinhole-like. Anterior peduncle of petiole short and stout, with a small lobulate ventral process. Petiole node with anterior face longer and somewhat more shallowly sloped than posterior face; the node narrowly but bluntly rounded above. Postpetiole smaller and slightly lower than petiole, much more broadly rounded dorsally. All dorsal surfaces of head and body with standing hairs, the promesonotum with only 3 pairs. Anterior margin of pronotum without a pair of standing hairs between those at the humeri. Unsculptured except for the metanotal cross-ribs. Colour uniform dull pale yellow.

PARATYPE WORKERS. TL 1·4, HL 0·42–0·43, HW 0·32–0·33, CI 76–79, SL 0·26–0·28, SI 81–85, PW 0·20–0·21, AL 0·42–0·44 (10 measured). As holotype but some paratypes have a fourth promesontal pair of standing hairs.

Holotype worker, **South Africa**: E. Cape Prov., Walmer nr Port Elizabeth, 3.iii.1969, eucalypt litter, M374 (*W. L. Brown*) (MCZ).

Paratypes. 10 workers and 5 alate females with same data as holotype (MCZ; BMNH).

A minute yellow species close to and slightly larger than *mictilis*, but lacking the depressed head capsule of that species and having the promesonotum somewhat more convex. Apart from this the head in *mictilis* tends to be somewhat narrower (CI 72–76 as opposed to CI 76–79 in *fastidium*) and slightly different in shape. Whereas in *fastidium* the head in full-face view is broadest behind and narrows anteriorly, the head in *mictilis* is broadest immediately behind the eyes and gradually narrows both anteriorly and posteriorly from this point.

Monomorium firmum Santschi

(Fig. 67)

Monomorium firmum Santschi, 1926*a*: 231. Syntype workers, ZIMBABWE: Vumba Mts, 6000 ft (1830 m), Cloudlands 6–17.iv.1923 (*G. Arnold*) (BMNH; NMB) [examined].

WORKER. TL 2·6–2·8, HL 0·58–0·66, HW 0·46–0·54, CI 79–83, SL 0·50–0·56, SI 100–109, PW 0·30–0·33, AL 0·70–0·76 (10 measured).

Clypeal carinae conspicuous, relatively close together, feebly divergent anteriorly and sometimes the carinae broken or interrupted at about their midlength. Space between the clypeal carinae shallowly transversely concave. Anterior margin of narrow prominent median section of clypeus weakly concave, the anterior and lateral margins of this section separated by blunt angles, without projecting denticles. Maximum diameter of eye 0·20–0·22 × HW and with 6–7 ommatidia in the longest row. With the head in full-face view the eyes close to the midlength of the sides, usually the posterior margins of the eyes at or even slightly behind the midlength of the sides. Antennal scapes, when laid straight back from their insertions, reaching or slightly surpassing the occipital margin. Sides of head evenly shallowly convex in full-face view and the occipital margin shallowly convex or the median area more or less flat. Promesonotum in profile a low convexity, descending behind to the broad impressed metanotal groove which is traversed by long strong cross-ribs. Propodeal spiracle large and conspicuous. Petiole node in profile relatively low, broadly subconical and with both anterior and posterior faces weakly convex. Subpetiolar

process a conspicuous lobe. Postpetiole lower than petiole, smaller and more broadly rounded in profile. All dorsal surfaces of head and body with numerous standing hairs, the promesonotum with more than 8 pairs. Mostly unsculptured and shining except for scattered hair-pits, but the metanotal groove cross-ribbed and the mesopleuron in some with traces of weak reticulate sculpture. Colour yellow.

Known only from the type-series, this relatively large yellow species is a conspicuous member of the *schultzei*-complex. It is closest related to *vecte*, also known from Zimbabwe, the two together being distinguished from the remaining *schultzei*-complex members which have relatively large propodeal spiracles by their dense pilosity. Of all *schultzei*-complex members in which the metanotal groove is broad and traversed by long conspicuous cross-ribs, and the propodeal spiracle is large, only *firmum* and *vecte* have 8 or more pairs of hairs on the promesonotal dorsum. Differences separating the two are noted under *vecte*.

MATERIAL EXAMINED

Zimbabwe: Vumba Mts (*G. Arnold*).

Monomorium floricola (Jerdon)

Atta floricola Jerdon, 1851: 107. Syntype workers, INDIA. [No types known to exist.]

Monomorium poecilum Roger, 1863*a*: 199. Syntype workers, female, CUBA (probably in MNHU) [not seen]. [Synonymy by Emery, 1894: 151.]

Monomorium cinnabari Roger, 1863*a*: 199. Syntype workers, CUBA (probably in MNHU) [not seen] [Provisional synonymy by Wheeler, 1913: 486.]

Monomorium specularis Mayr, 1866: 509. Syntype workers, WEST SAMOA: Upolu (NMV) [not seen]. [Synonymy by Mayr, 1878: 671.]

Monomorium floricola (Jerdon) Mayr, 1878: 671.

Monomorium impressum Smith, 1876: 447. Syntype females, male, RODRIGUEZ I. (*Gulliver*) (BMNH) [examined]. **Syn. n.**

Monomorium (Monomorium) angusticlava Donisthorpe, 1947: 189. Paratype workers, NEW GUINEA: Maffin Bay, 27.vi.1944 and viii.1944 (*E. S. Ross*) (BMNH) [examined]. **Syn. n.**

Note on synonymy. The Japanese species *M. intrudens* Smith (1874) was synonymised with *floricola* by Wheeler (1906: 310), acting on a note which he received from Emery. Neither author had seen the *intrudens* holotype (in BMNH) and were working from Smith's original description. Examination of the holotype shows that the synonymy of *intrudens* under *floricola* was incorrect and that the two are separate species. Comparison of *intrudens* holotype with fresh Japanese material of *Monomorium* shows it to be the senior synonym of *M. nipponense* Wheeler (1906), the holotype corresponding well with *nipponense* material collected by Masahiro Tanaka at Yoshida-yama, Kyoto. Thus *M. intrudens* Smith is removed from the synonymy of *floricola*, reinstated as a valid species, and is the senior synonym of *M. nipponense* Wheeler. Some ecological work on this species has recently been carried out by Ochi (1983).

WORKER. TL 1·7–2·0, HL 0·42–0·48, HW 0·32–0·37, CI 75–80, SL 0·29–0·34, SI 86–94, PW 0·20–0·24, AL 0·40–0·50 (30 measured).

Anterior margin of prominent median portion of clypeus usually shallowly concave between the apices of the clypeal carinae; sometimes more or less transverse. Clypeal carinae quite sharply developed, relatively widely separated and feebly divergent anteriorly. Anterior and lateral borders of prominent median portion of clypeus separated by an angle. Maximum diameter of eye 0·21–0·24 × HW. In profile the eye consisting of an outer ring of ommatidia which encloses a single inner longitudinal row. Eye always distinctly longer than high and the encircled row with 2–4 (usually 3) ommatidia. Individuals in several samples show an extra 1–2 ommatidia above or below the longitudinal row, but this is rare. In full-face view the eyes in front of the midlength of the sides. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Promesonotum shallowly convex in profile, sloping posteriorly to the shallowly impressed metanotal groove; in a few samples the metanotal groove is virtually unimpressed. Dorsum of propodeum on a slightly lower level than the promesonotum, the dorsum rounding broadly and evenly into the declivity. Node of petiole in profile bluntly subconical, the ventral process of the peduncle confluent posteriorly with the ventral margin of the node so that the ventral outline of the petiole node is flat or nearly so; there is no conspicuous convex bulge of the margin behind the termination of the subpetiolar process. Node of postpetiole in profile about the same size as that of the petiole or slightly smaller; the postpetiole node more broadly rounded than that of the petiole. All dorsal surfaces of the head and body with standing hairs present; the promesonotum with 5 pairs and the

propodeum with a single pair. Smooth and shining, unsculptured except for the metanotal cross-ribs and sometimes a little reticular sculpture on the pleurae. Colour variable but colour pattern characteristic. Head and gaster dark brown to black, the gaster sometimes slightly darker than the head. Alitrunk yellow to brown, usually strongly contrasting with the head and only rarely almost as dark in colour, generally much lighter than the head. Petiole and postpetiole yellow and usually lighter than the alitrunk or the same colour as the alitrunk.

An extremely successful pantropical tramp-species, *floricola* has been widely dispersed by human commercial activity. In temperate zones it can establish itself in hothouses and other constantly heated buildings, and recently it has been reported nesting in centrally heated blocks of flats in England. A bibliography of the species and its North American distribution are given by Krombein *et al.* (1979). The Neotropical distribution of *floricola* is given by Kempf (1972) and its occurrence in Polynesia is documented by Wilson & Taylor (1967).

In the Afrotropical fauna *floricola* shares the character combination of 12-segmented antennae and eye form as described above with only 5 other species. None of these show the colour pattern of *floricola* and all have antennal scapes which are relatively shorter, see comparative measurements under *rotundatum*.

MATERIAL EXAMINED

Afrotropical region. **Ghana**: Tafo (*B. Bolton*); Tafo (*C. A. Collingwood*); Legon (*D. Leston*); Kibi (*D. Leston*). **Togo**: Tové (*B. Dufour*). **Nigeria**: Gambari (*B. Bolton*). **Cameroun**: Nkoemvon (*D. Jackson*). **Tanzania**: Zanzibar, Chwaka (*M. J. Way*).

Other regions. **India**: Bangalore (*T. M. Ali*); NE India (*S. P. Kurl*). **Sri Lanka**: no loc. (*H. S. Andrewes*); Colombo (*A. Baur*). **Burma**: Bhamo (*Bingham*). **Andaman Is.** (*G. Rogers*). **Mauritius**: Rose Hill (*R. Mamet*); Beau Bassin (*R. Mamet*). **Aldabra**: South I. (*B. Cogan & A. Hutson*). **Chagos Archipelago**: Diego Garcia (*A. M. Hutson*). **Rodriguez I.** (coll. F. Smith). **Seychelle Is.**: Little Sister I. (*U. Müller*), Cousin I. (*G. M. Bathe*). **Japan**: Iriomote, Mt Sonai-dake (*M. Tanaka*). **East Malaysia**: Sarawak (*Haviland*). **Indonesia**: Sulawesi, Dumoga Bone N.P. (*P. Hammond*); Dumoga Bone N.P. (*N. Stork*). **Papua New Guinea**: Kokoda (*L. Cheesman*); Cyclops Mts, Sabron (*L. Cheesman*); Maffin Bay (*E. S. Ross*). **Solomon Is.**: New Georgia (*H. T. Pagden*); Tulagi (*R. A. Lever*); Guadalcanal (*E. S. Brown*). **New Hebrides**: Malekula (*L. Cheesman*); Santo (*L. Cheesman*); Eromanga (*L. Cheesman*). **Samoa**: Upolu, Apia (*Buxton & Hopkins*); Apia (*N. Swale*); Apia (*C. L. Edwards*); Tutuila (*Swezey & Wilder*). **Fiji Is.**: Nabavatu (*T. H. C. Taylor*); Taveuni, Waiyevi (*H. S. Evans*). **Hawaii**: Oahu, Waianae (*N. L. H. Krauss*). **Gilbert Is.**: S. Tarawa (*P. Maddison*). **Antilles**: St Lucia (no coll. name). **West Indies**: Grenada (*H. H. Smith*). **Puerto Rico**: Mayaquez (*M. R. Smith*). **Guiana**: Georgetown (*G. E. Bokin*). **Brazil**: S.P., Ribeirao Preto (*W. Hamilton*). **Colombia**: Gorgona I. (*L. E. Cheesman*). **U.S.A.**: Florida, Fort Mayers (*W. M. Barrows*). **Great Britain**: Wales, Bangor (*A. J. Rundle*); England, London (no coll. name).

Monomorium fugelanum sp. n.

(Fig. 88)

HOLOTYPE WORKER. TL 1·8, HL 0·50, HW 0·39, CI 78, SL 0·36, SI 92, PW 0·25, AL 0·52.

Clypeal carinae strongly developed, raised and markedly divergent anteriorly; the carinae running to the anterior margin. Prominent median portion of clypeus with a transverse anterior margin, flanked by a pair of low triangular projections which distinctly separate the anterior and lateral margins of the median clypeus. Eyes relatively large, 0·26 × HW and with 7 ommatidia in the longest row. In full-face view the posterior margins of the eyes are conspicuously in front of the midlength of the sides of the head. Antennal scapes, when laid straight back from their articulations, just failing to reach the occipital margin. Sides of head behind eyes very shallowly convex in full-face view, extremely feebly convergent posteriorly. Occipital margin broad and more or less transverse, with only the merest trace of concavity towards the centre. Promesonotal dorsum evenly shallowly convex in profile, sloping posteriorly to the narrow and shallowly impressed metanotal groove. Metanotal cross-ribs short and inconspicuous and the propodeal spiracle minute, pinhole-like. Propodeal dorsum a long shallowly convex slope which rounds very broadly and evenly into the short declivity, the two surfaces not distinctly separated. Node of petiole high and narrow in profile, the anterior peduncle with a small lobate ventral process. Postpetiole smaller than petiole, scarcely broader but lower, more broadly rounded above and with a long vertical anterior face. All dorsal surfaces of head and body with standing hairs, the promesonotum with 5 pairs. Sculpture absent except for scattered minute hair-pits and feeble metanotal cross-ribs. Colour yellow.

PARATYPE WORKERS. TL 1·7–1·8, HL 0·48–0·50, HW 0·36–0·39, CI 74–78, SL 0·33–0·36, SI 92–95, PW 0·22–0·26, AL 0·48–0·52 (6 measured). Maximum diameter of eye 0·26–0·28 × HW. As holotype.

Holotype worker, **Botswana**: Maxwee, mopane woodland, 19.v.1976, No. 41 (*A. Russell-Smith*) (BMNH).

Paratypes. 10 workers with same data as holotype (BMNH; MHN; MCZ).

The closest relatives of *fugelanum*, and their separations, are discussed under *altinode*.

Monomorium gabrielense Forel **stat. n.**

(Fig. 76)

Monomorium rhopalocerum var. *gabrielensis* Forel, 1916: 418. Syntype workers, female, ZAIRE: St Gabriel (*Kohl*) (MHN) [examined].

WORKER. TL 1·5–1·6, HL 0·38–0·40, HW 0·30–0·32, CI 78–84, SL 0·30–0·31, SI 95–100, PW 0·19–0·20, AL 0·42–0·44 (10 measured).

Clypeal carinae close posteriorly, moderately divergent anteriorly and reaching the anterior margin. Prominent median portion of clypeus narrow, the anterior margin between the apices of the carinae shallowly concave. Anterior and lateral margins of median portion of clypeus separated by an angle, without projecting denticles. Eyes relatively small, their maximum diameter 0·19–0·22 × HW and with 5 ommatidia in the longest row. With the head in full-face view the eyes close to the midlength of the sides; usually the posterior margins of the eyes on the midline. Antennal scapes, when laid straight back from their insertions, slightly exceeding the occipital margin. In full-face view the sides behind the eyes and the occipital margin usually forming a single even convexity, but in a few workers a minute mid-occipital depression may be present. In profile the dorsal and ventral surfaces of the head distinctly biconvex. Promesonotum in profile smoothly and evenly convex, sloping posteriorly to the shallowly impressed metanotal groove, highest point of promesonotal curve on a conspicuously higher level than the propodeum. Cross-ribs of metanotal groove short and inconspicuous, the propodeal spiracle large and easily visible. Propodeal dorsum highest just behind metanotal groove, sloping posteriorly to the obtuse rounded angle which separates dorsum from declivity; the two surfaces not forming a smooth even curve. Petiole node in profile subconical and narrowly rounded above, the subpetiolar process a narrow and inconspicuous laminar strip. Postpetiole node smaller, lower and more broadly convex than petiole node in profile. All dorsal surfaces of head and body with standing hairs present, the promesonotum with 4–5 pairs, and many hairs on head and first gastral tergite blunt or truncated apically. Sculpture consisting only of scattered hair-pits, metanotal cross-ribs, and a band of fine reticulation traversing the mesopleuron; otherwise entirely smooth and shining. Colour yellow, the gaster with a brownish tint.

The minute pale *gabrielense* is close to *noxitum*, *draxocum* and *strangulatum*. The last named is immediately separable as it has only 11 antennal segments, as opposed to 12 in the remainder. Both *noxitum* and *draxocum* are brown to black in colour, much darker than *gabrielense*, and both are larger, though only slightly so in *draxocum*. Comparative dimensions are as follows.

	HW	SL	PW
gabrielense	0·30–0·32	0·30–0·31	0·19–0·20
draxocum	0·32–0·35	0·32–0·36	0·22–0·23
noxitum	0·37–0·40	0·39–0·42	0·24–0·27

MATERIAL EXAMINED

Gabon: Ile aux Singes (*J. A. Barra*). **Zaire**: St Gabriel (*Kohl*).

Monomorium guillarmodi Arnold

Monomorium (*Lampromyrmex*) *guillarmodi* Arnold, 1946: 63, figs 15, 15a. Syntype workers, female, LESOTHO: Mamathes, 5.ix.1942 (*C. Jacot-Guillarmod*) (SAM) [examined].

WORKER. TL 1·6–1·7, HL 0·40–0·41, HW 0·32–0·33, CI 78–80, SL 0·23–0·24, SI 72–75, PW 0·20–0·21, AL 0·38–0·42 (3 measured).

Basal (fourth) tooth of the smooth mandibles less than half the size of the third tooth. Median portion of

anterior clypeal margin transverse or with a shallow and narrow central indentation. Maximum diameter of eye 0·15–0·17 × HW and with 5 ommatidia in the longest row. Peripheral ring of ommatidia enclosing more than one longitudinal row. Antennae with 11 segments, the scapes relatively short (SI < 80), failing to reach the occipital margin when laid straight back from their insertions. In full-face view the sides of the head evenly shallowly convex and the occipital margin almost transverse, with only the slightest indentation centrally. Median portion of clypeus prominent and with sharply defined anterolateral angles, with fine but conspicuous carinae. Posterior margins of eyes in front of the midlength of the sides in full-face view. In profile the anterior curved declivity of the pronotum is followed by a flat promesonotal surface which terminates at the narrowly and shallowly impressed metanotal groove. Behind the metanotal groove the propodeal dorsum is shallowly convex and slopes posteriorly to its bluntly rounded junction with the declivity, the two surfaces meeting at the level of the pinhole-like spiracle. Petiole node markedly larger than postpetiole node in profile, the dorsal outline of the latter low and evenly domed-convex. Petiole node in profile with a short anterior peduncle which is subtended by a narrow ridge-like anteroventral process; ventral surface of petiole below the highest point of the node is broadly convex, the convexity projecting ventrally more than does the subpetiolar process. Petiole node low and bluntly triangular, narrowly rounded above. In dorsal view both nodes of approximately equal width, both slightly broader than long. Entire body unsculptured, smooth and shining except for narrow cross-ribbing at the metanotal groove. Dorsum of head with 1–2 pairs of standing hairs along the occipital margin and a pair at the frontal lobes, but the head between these lacking standing hairs. Dorsal alitrunk without standing hairs. Petiole and postpetiole each with a single pair of backward directed hairs and gaster with sparse similar pilosity. Colour glossy light to medium brown.

Immediately isolated from all other Afrotropical *Monomorium* in which the antennae have 11 segments by its lack of standing hairs anywhere on the dorsal alitrunk and their paucity elsewhere on the body.

MATERIAL EXAMINED

Lesotho: Mamathes (*C. Jacot-Guillarmod*).

Monomorium holothir sp. n.

HOLOTYPE WORKER. TL 1·9, HL 0·50, HW 0·36, CI 72, SL 0·34, SI 94, PW 0·24, AL 0·48.

Clypeal carinae sharply developed, conspicuously elevated and crest-like, divergent anteriorly and reaching the anterior margin at a pair of short low triangular projecting angles. These projecting angles separate the transverse to feebly concave anterior margin of the prominent median portion of the clypeus from its lateral margins. Eyes relatively large, their maximum diameter 0·30 × HW and with 8–9 ommatidia in the longest row. In profile the maximum diameter of the eye distinctly greater than the distance between the anteriormost point of the eye and the nearest point of the mandibular articulation. In full-face view the posterior margins of the eyes slightly in front of the midlength of the sides. Antennal scapes, when laid straight back, failing to reach the occipital margin. With the head in full-face view the sides shallowly convex behind the eyes, scarcely converging posteriorly until close to the occipital corners, then rounding into the broad and moderately concave occipital margin. Head in profile conspicuously dorsoventrally flattened, the ventral surface more convex than the dorsal. Promesonotal dorsum evenly shallowly convex in profile, sloping posteriorly to the narrow and feebly impressed metanotal groove. Metanotal cross-ribs short and inconspicuous, the propodeal spiracle small and pinhole-like. Propodeal dorsum evenly sloping, the posterior third more strongly sloping than the anterior two-thirds but without strongly differentiated dorsal and declivous faces. Petiole node high and narrowly subconical, narrowly rounded above, the overall shape and ventral process very similar to that of *katir* (Fig. 74). All dorsal surfaces of head and body conspicuously hairy, the promesonotum somewhat abraded but with about 8 pairs of standing hairs. Sculpture absent except for scattered hair-pits and short metanotal cross-ribs. Colour yellow to light brownish yellow.

PARATYPE WORKERS. TL 1·8–1·9, HL 0·48–0·50, HW 0·36–0·37, CI 74–75, SL 0·33–0·34, SI 92, PW 0·22–0·24, AL 0·46–0·48 (2 measured). Maximum diameter of eye 0·30–0·32 × HW; otherwise as holotype.

Holotype worker, **Kenya**: L. Baringe, 1.xii.1983 (*J. Darlington*) (BMNH).
Paratypes. 2 workers with same data as holotype (BMNH; MCZ).

This small yellowish large-eyed species is superficially very similar to the Namibian *katir*, but is much more densely hairy, has relatively somewhat smaller eyes and more sharply developed clypeal carinae, and

has the head more strongly dorsoventrally flattened. Other related large-eyed species, which are darker in colour, are discussed under *balathir*.

Monomorium inquietum Santschi

Monomorium inquietum Santschi, 1926*a*: 233, fig. 3D. Syntype workers ZAIRE: Haut Uelé, Moto, 1920 (*L. Burgeon*) (NMB; MRAC) [examined].

WORKER. TL 1·7–1·8, HL 0·45–0·46, HW 0·38, CI 83, SL 0·29–0·30, SI 76–79, PW 0·21–0·22, AL 0·46–0·47 (2 measured).

Anterior clypeal margin without a differentiated prominent median section with discrete anterior and lateral borders; instead the anterior clypeal margin broadly and quite evenly convex between the inner points of the mandibular insertions. Clypeal longitudinal carinae vestigial to absent. Eyes small, 0·16 × HW and with 4–5 ommatidia in the longest row. Eyes consisting of an outer ring of ommatidia which encloses a single short longitudinal ommatidial row. With the head in full-face view the eyes conspicuously far in front of the midlength of the sides, and the scapes, when laid straight back from their insertions, very obviously failing to reach the occipital border. SI < 80. Occipital margin very broad, evenly shallowly concave across its width. Sides of head shallowly convex. Dorsal outline of promesonotum shallowly convex and low, only slightly higher than the propodeum. Mesonotum sloping evenly to the feebly impressed metanotal groove, without a posterior section which is suddenly downcurved or more steeply sloping than the remainder. Propodeum with a small spiracular orifice, the dorsal outline of the propodeum convex in profile, the dorsum rounding broadly and evenly into the declivity. Petiole node in profile low and broadly subconical, narrowly rounded above. Subpetiolar process a low keel, semitranslucent. Postpetiole low and very rounded in profile, the size of the postpetiole only slightly less than that of the petiole. Standing hairs sparsely present on all dorsal surfaces, the promesonotum with 4 pairs, the propodeum with a single pair. Except for hair-pits and short cross-ribs at the metanotal groove, the entire body is unsculptured and smooth. Colour uniform glossy brown, the gaster slightly darker in shade than the head and alitrunk.

Known only from two syntypes collected in Zaire, this small species is conspicuous by its combination of uniformly dark colour, small eyes, and clypeal structure. The form of the eye is the same in only five other species occurring in sub-Saharan Africa. Of these *sryetum* has only a single pair of hairs on the dorsal alitrunk and *floricola* has much longer scapes (SI 86–94). The remaining three, *trake*, *rotundatum* and *shilohense*, are mostly or entirely yellow in colour, and the last named has relatively large eyes (0·23–0·24 × HW). Comparative measurements of the six species are given under *rotundatum*.

MATERIAL EXAMINED

Zaire: Haute Uelé, Moto (*L. Burgeon*).

Monomorium iyenasu sp. n.

SYNTYPE WORKERS TL *ca.* 3·5, HL 0·84–0·86, HW 0·72–0·74, CI 86, SL 0·54, SI 73–75, PW 0·46–0·52, AL 0·94–1·02 (3 measured).

Clypeal carinae weakly developed and only poorly defined, widely divergent anteriorly. Prominent median portion of clypeus with its anterior margin strongly concave, the concavity bounded on each side by a blunt obtusely angled projection of the margin. Eyes relatively small, 0·19 × HW and with 8–9 ommatidia in the longest row. In full-face view the eyes distinctly in front of the midlength of the sides but their posterior margins close to the midlength. Antennal scapes relatively short (SI < 80), when laid straight back from their insertions conspicuously failing to reach the occipital margin. Sides of head shallowly convex, converging anteriorly in front of the eyes and posteriorly behind them in full-face view. Occipital margin broadly but shallowly concave across almost its entire width. With the head in profile the outline biconvex, the ventral surface somewhat more strongly convex than the dorsum, the deepest point of the head occurring just behind the level of the eye. Promesonotal dorsum evenly convex, on a much higher level than the propodeum, and sloping posteriorly to the narrowly but deeply impressed metanotal groove. Metanotal cross-ribs strong and conspicuous both dorsally and laterally. Propodeal spiracle large and dominating the side of the sclerite. Propodeal dorsum sloping steeply posteriorly, rounding bluntly into the near-vertical declivity. Petiole node high and subconical in profile, narrowly rounded above. Subpetiolar process a narrow anteroventral rim or strip below the peduncle. Postpetiole much more broadly rounded dorsally than petiole in profile, somewhat anteroposteriorly compressed and lower than the petiole. All dorsal surfaces of head and body very densely hairy, the promesonotum with 20 or so pairs of standing hairs. Head dorsally with numerous conspicuous hair-pits. Remainder of body with less

obvious hair-pits dorsally but otherwise unsculptured except for the metanotal cross-ribs and some faint metapleural striation. Colour predominantly yellowish brown, the cephalic dorsum and apical half of the gaster darker in shade than the remainder. In two of the syntypes the propodeal dorsum is as dark as the head.

Syntype workers, **Tanzania**: Shinyanga, no further data (*O. W. Richards*) (BMNH).

This very distinctive species is described from three damaged workers, mounted on a single pin. The upper and middle specimens are lacking the post-petiole and gaster, the lower specimen is lacking its head. Because of this damage the three have been described collectively and are treated as a syntypic series.

Perhaps the most easily recognized species of this group in the Afrotropical region, *iyenasu* lacks obvious relatives and appears out of place as regards the remainder of the regional *Monomorium* fauna. The combination of large size, short scapes, dense pilosity, relatively small eyes and large propodeal spiracle render *iyenasu* immediately recognizable.

Monomorium katir sp. n.

(Figs 72, 74)

Holotype worker. TL 1·9, HL 0·50, HW 0·38, CI 76, SL 0·34, SI 89, PW 0·25, AL 0·50.

Clypeal carinae well developed, distinctly divergent anteriorly and terminating in a pair of weakly salient but acute angles on the anterior margin, these prominent angles separating the shallowly concave anterior margin of the median projecting portion of the clypeus from its sides. Eyes relatively very large, their maximum diameter 0·37 × HW and with 7–8 ommatidia in the longest row. In profile the maximum diameter of the eye is almost two times greater than the distance separating the anteriormost point of the eye from the nearest point of the mandibular articulation. In full-face view the eyes in front of the midlength of the sides, their posterior margins approximately at the midlength. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head in full-face view widest at the eyes, shallowly convex and weakly convergent posteriorly. Occipital margin almost transverse, with only the faintest hint of concavity. Head in profile somewhat dorsoventrally flattened, the ventral surface less convex than the dorsal. Promesonotum shallowly convex in profile, sloping posteriorly to the narrow and shallowly impressed metanotal groove. Metanotal cross-ribs short and inconspicuous, the propodeal spiracle small. Petiole node high and narrow in profile, narrowly rounded above. Anterior peduncle of petiole short and stout, the ventral process conspicuous. Postpetiole node smaller lower and more broadly rounded than the petiole. Dorsal surfaces of body only sparsely hairy, the promesonotum with only 3 pairs of standing hairs, but all dorsal surfaces with standing hairs present. Sculpture absent except for minute scattered hair-pits, weak metanotal cross-ribs and some vestigial traces on the mesopleuron. Colour glossy light brownish yellow, the head and gaster slightly darker in shade than the alitrunk.

Paratype workers. TL 1·7–1·9, HL 0·48–0·51, HW 0·35–0·38, CI 72–76, SL 0·32–0·34, SI 89–94, PW 0·23–0·25, AL 0·44–0·50 (12 measured). As holotype but maximum diameter of eye 0·35–0·38 × HW. Some workers have only two pairs of promesonotal standing hairs, the posteriormost pair being absent, and the subpetiolar process may be smaller and less conspicuous than is indicated in Fig. 74.

Holotype worker, **Namibia**: Namib desert, 15° 18′ E, 23° 06′ S, pitfall sample P3, 1984 (*A. C. Marsh*) (BMNH).

Paratypes. 11 workers with same data as holotype; 6 workers with same data but 15° 24′ E, 23° 06′ S, sample P4 (BMNH; MHN; MCZ).

The relatively very large eyes of this small species and its reduced dorsal pilosity render it easily recognizable. For discussion of related species see under *balathir*.

Monomorium kelapre sp. n.

Holotype worker. TL 1·9, HL 0·50, HW 0·40, CI 80, SL 0·32, SI 80, PW 0·24, AL 0·52.

Prominent median portion of clypeus with its anterior margin evenly broadly convex. Clypeal carinae vestigial, low rounded and poorly defined, fading out anteriorly. Maximum diameter of eye 0·20 × HW and with 6 ommatidia in the longest row. In full-face view the eyes distinctly in front of the midlength of the sides. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin,

the scapes relatively short (SI 80). Outline shape of head very similar to that of *boerorum* (Fig. 63), the occipital margin broad and broadly shallowly concave. Promesonotum in profile convex anteriorly, the highest point well in front of the midlength, on the pronotum itself rather than at the junction of pronotum and mesonotum. Pronotum behind the highest point and mesonotum forming a posteriorly sloping, almost flat surface to the metanotal groove. Posterior fraction of mesonotum suddenly downcurved to the narrow but deeply impressed metanotal groove, which is narrowly U-shaped. Metanotal cross-ribs short but conspicuous. Propodeal dorsum convex and sloping posteriorly, highest immediately behind the metanotal groove; rounding broadly and evenly into the declivity through a steep curve. Propodeal spiracle very large, dominating the side of the sclerite. Petiole with a short anterior peduncle which is subtended by a translucent strip-like anteroventral process which is trunctated anteriorly. Petiole node subconical in profile, narrowly but bluntly rounded above, its anterior face more or less flat and its posterior face very slightly convex. Postpetiole node smaller, lower and narrower than petiole, but somewhat more broadly rounded above. All dorsal surfaces of head and body with standing hairs, the promesonotum with 6–7 pairs and the propodeum with 3 pairs, the anteriormost of which is very short. Sculpture absent except for hair-pits and metanotal cross-ribs. Colour glossy light brown.

Holotype worker, **South Africa**: Port Elizabeth (ex. coll. *G. Mayr*) (BMNH).

This conspicuous small species is founded on a single specimen from that part of the Mayr collection which has been deposited in BMNH. It bears a label in Mayr's writing which says '*minutum* var. s. nahe *madecass*.' *M. kelapre* is not closely related to *minutum* (=*monomorium*) nor *madecassum*; its closest relative appears to be *boerorum*, also from South Africa. The two are separated by density of pilosity (*boerorum* having only 3–4 pairs of promesonotal hairs) and by the relatively very large propodeal spiracle of *kelapre*.

Monomorium kineti Weber **stat. n.**

(Fig. 64)

Monomorium (Monomorium) minutum subsp. *kineti* Weber, 1943: 359, pl. 15, figs 10, 19. Syntype workers, female, male, SUDAN: Imatong Mts, Mt Kineti, 10,458 ft (3190 m), 27.vii.1939, no. 1334 (MCZ syntype workers no. 1335) (*N. A. Weber*) (MCZ) [examined].

WORKER. TL 2·2–2·4, HL 0·56–0·60, HW 0·45–0·48, CI 77–80, SL 0·46–0·47, SI 100–102, PW 0·26–0·30, AL 0·62–0·64 (6 measured).

Clypeal carinae moderately developed, close together and not strongly divergent anteriorly. Anterior clypeal margin between apices of clypeal carinae approximately transverse to feebly concave, the carinal apices not marked by projecting denticles or sharply prominent angles. Maximum diameter of eye 0.21–0.22 × HW and with 6–7 ommatidia in the longest row. In full-face view the eyes with their posterior margins at the midlength of the sides and the scapes, when laid straight back from their insertions, reaching the occipital margin. Head in full-face view with sides approximately straight to very shallowly convex, posteriorly the sides broadly curved to their junction with the short, centrally feebly concave, occipital margin. Head in profile with both dorsal and ventral surfaces convex. Promesonotum in profile with its dorsal outline evenly convex, the highest point just in front of the midlength and conspicuously on a much higher level than the propodeum. Posterior quarter of mesonotum abruptly truncated behind the final pair of hairs and descending about vertically to the conspicuously impressed broad metanotal groove. Propodeal dorsal outline gently sloping posteriorly then abruptly rounding into the steep declivity. Dorsum of propodeum flat or more usually weakly transversely concave between a pair of blunt and poorly defined longitudinal rims which separate the dorsum proper from the sides and which are divergent posteriorly. Propodeal spiracle large and conspicuous, not pinhole-like. Subpetiolar process very small indeed, vestigial in some individuals. Node of petiole in profile subconical and narrowly rounded above, the postpetiole smaller than the petiole, lower and evenly convex dorsally. Head and body unsculptured and smooth everywhere except for hair-pits and vestiges of sculpture on the pleurae. Metanotal groove traversed by long strong cross-ribs, which continue for some distance down the sides of the alitrunk. All dorsal surfaces of head and body with standing hairs present, the promesonotum with 6–7 pairs. Colour uniform dull yellow to brownish yellow.

M. kineti is a distinctive species of the Afrotropical *schultzei*-complex and not closely related to *minutum*, as it was first described by Weber. *M. kineti* and its close relatives *crawleyi*, *arboreum*, *firmum* and *vecte* share, within the complex, the characters of broad metanotal groove which has long strong

cross-ribs, and an enlarged very conspicuous propodeal spiracle. Weber (1943: 312–313) summarizes what little is known of the biology of this species. He notes that *kineti* is found on the tops of the highest peaks in the Imatong Mountains and occurs only at considerable elevations. The first nest found was in cavities in the base of a dead woody stem and in chambers in the surrounding soil. Other nests discovered were located in the soil under small stones, among the roots of grasses and in the pith-cavities of herbaceous stems. In the open the ants move sluggishly and may ascend tree trunks, but in general *kineti* appears to be subterranean. Coccids are tended in the underground galleries.

MATERIAL EXAMINED

Sudan: Imatong Mts (*N. A. Weber*).

Monomorium lene Santschi

Monomorium lene Santschi, 1920*b*: 11, figs 2g–2h. Syntype workers, ZIMBABWE: Salisbury (= Harare), iv.1917, no. 421 (*R. W. Tucker*) (BMNH; NMB) [examined].

WORKER. TL 1·8–2·1, HL 0·45–0·51, HW 0·35–0·42, CI 78–84, SL 0·29–0·34, SI 79–85, PW 0·23–0·27, AL 0·48–0·53 (10 measured).

Clypeal carinae close together posteriorly and widely divergent anteriorly, meeting the anterior margin in a pair of projecting angles or broad low denticles. Anterior margin of prominent median portion of clypeus distinctly concave between these angles, the concavity accentuating their projection. Maximum diameter of eye 0·21–0·23 × HW and with 5–6 ommatidia in the longest row. In full-face view the eyes situated in front of the midlength of the sides. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Promesonotal dorsum shallowly convex in profile, sloping posteriorly to the narrow and only shallowly impressed metanotal groove. Metanotal cross-ribs present but short and inconspicuous. Propodeal spiracle large and dominating the sides of the sclerite. Node of petiole in profile low and subconical, narrowly rounded above. Anteroventral process of petiole peduncle an inconspicuous ridge which is truncated anteriorly and may be reduced in some individuals. Postpetiole in profile smaller and somewhat lower than the petiole, slightly anteroposteriorly compressed and broadly rounded above. All dorsal surfaces of head and body with numerous standing hairs, the promesonotum with 6–7 pairs. Head and body entirely lacking sculpture except for scattered minute hair-pits and metanotal cross-ribs. Colour yellow.

In the *leopoldinum*-complex three species, *borlei*, *lene*, and *leopoldinum*, have relatively very large propodeal spiracles which dominate the side of the sclerite. This feature is best developed in *leopoldinum* itself (Fig. 66), but the spiracle is only fractionally smaller in *lene*. Of the three *borlei* has only 3 pairs of standing hairs on the promesonotal dorsum, whereas the other two have more than 4 pairs (usually 6–7). *M borlei* also has relatively long antennal scapes (SI 90–93) compared to the other two, which together show a range of SI 79–86. Separation of *leopoldinum* and *lene* rests on colour (the former is brown, the latter yellow) and the fact that the propodeal spiracle tends to be even larger in the former than in the latter.

MATERIAL EXAMINED

Tanzania: no loc. (*O. W. Richards*). **Zimbabwe**: Harare (*R. W. Tucker*). **Botswana**: Shorobe (*A. Russell-Smith*); Kobies (*Vernay-Lang*).

Monomorium leopoldinum Forel **stat. n.**

(Fig. 66)

Monomorium minutum var. *leopoldinum* Forel, 1905: 179. Syntype workers, ZAIRE: St Gabriel, and Stanleyville (*Luja*) (MNH) [examined].

Monomorium explorator Santschi, 1920*b*: 12, figs 1a–b. Holotype worker, GABON: Samkita (*F. Faure*) (NMB) [examined]. **Syn. n.**

Monomorium aequum Santschi, 1928: 195, fig. 3b. Holotype worker, ZAIRE: Stanleyville (*Reichensperger*) (NMB) [examined]. **Syn. n.**

Monomorium (Monomorium) estherae Weber, 1943: 361, pl. 15, fig. 18. Syntype workers, SUDAN: Imatong Mts, 5050 ft (1540 m), 4.viii.1939, no. 1423 (*N. A. Weber*) (MCZ) [examined]. **Syn. n.**

WORKER. TL 1·9–2·4, HL 0·50–0·57, HW 0·38–0·46, CI 76–82, SL 0·32–0·39, SI 83–86, PW 0·24–0·30, AL 0·50–0·58 (20 measured).

Clypeal carinae moderately to sharply developed, widely divergent anteriorly and terminating on the anterior clypeal margin in a pair of broad low triangular teeth or prominences which are usually obtuse. Median portion of anterior clypeal margin, between this pair of prominences, conspicuously broadly evenly concave; the prominences marking a clear distinction between the anterior and lateral margins of the projecting median portion of the clypeus. Maximum diameter of eye 0·19–0·23 × HW and with 5–6 ommatidia in the longest row. With the head in full-face view the eyes conspicuously in front of the midlength of the side, and the antennal scapes, when laid straight back, obviously failing to reach the occipital margin. In full-face view the sides of the head subparallel, the occipital margin broad and transverse or at most shallowly concave. Promesonotum evenly convex in profile and sloping evenly to the narrow moderately impressed metanotal groove. Propodeal outline highest at the metanotal groove and sloping posteriorly, the angle of the slope about the same as that of the mesonotum; dorsum and declivity of propodeum meeting in a broadly rounded angle. Propodeal spiracle very large, dominating the side of the sclerite. Nodes of petiole and postpetiole somewhat anteroposteriorly compressed, conspicuously transverse in dorsal view. In profile the petiole node narrowly rounded above, usually with the anterior face extremely feebly concave and the posterior face extremely feebly convex. Postpetiole with its anterior face high, vertical or nearly so; dorsum rounded, more broadly so than the petiole node. Mesopleuron with faint to vestigial traces of sculpture and metanotal groove with short cross-ribs, otherwise the entire body unsculptured and smooth except for hair-pits. Standing pilosity dense on all dorsal surfaces of head and body, the promesonotum very obviously with more than 4 pairs of hairs and the propodeum with more than 2 pairs. Colour light to dark brown, the legs the same colour as the alitrunk or slightly lighter. Rarely the legs much lighter than the alitrunk.

There is some variation in this species over its wide range which may indicate that the name as presently applied contains 2 or more sibling species. For example, the Sudanese sample is lighter in colour than those from Zaire and Kenya, and tends to have the metanotal groove somewhat narrower. The sample from Kajiado, Kenya, has very pale legs, paler than in other Kenyan material, and has the petiole node more nearly conical. The composition of *leopoldinum* will require further attention when more material is available, but my present opinion is that the names *explorator* and *aequum* will remain as absolute synonyms.

In Sudan Weber (1943) found this species nesting in the soil, the nest entrance forming a tiny crater.

The closest relatives of *leopoldinum* are *lene* and the Angolan *borlei*. The latter species has longer scapes and is much less densely hairy, having only 3 pairs of standing hairs on the promesonotum and a single pair on the propodeum. *M. lene* is yellow in colour and has a somewhat smaller propodeal spiracle, but otherwise is very close to *leopoldinum*.

Material examined

Gabon: Samkita (*F. Faure*). **Zaire**: St Gabriel (*Luja*); Stanleyville (*Luja*); Stanleyville (*Reichensperger*). **Sudan**: Imatong Mts (*N. A. Weber*). **Kenya**: Narok, Loita Hills, Morijo (*V. Mahnert & J.-L. Perret*); Kajiado (*W. Sands*); Kiambu (*R. H. le Pelley*).

Monomorium lubricum Arnold

(Fig. 90)

Monomorium lubricum Arnold, 1948: 217, fig. 7. Syntype workers, South Africa: Transvaal, Marieskop, vii.1944 (*J. C. Faure*) (SAM) [examined].

Worker. TL 2·3–2·5, HL 0·52–0·56, HW 0·44–0·47, CI 82–84, SL 0·35–0·38, SI 78–81, PW 0·27–0·28, AL 0·60–0·64 (5 measured).

Prominent median portion of clypeus with its anterior margin approximately transverse to very feebly concave, usually with an exceptionally small central indentation. Clypeal carinae weakly developed, widely separated and strongly divergent anteriorly. Projecting median section of anterior clypeal margin rounding into the anterolateral sections, not angulate nor denticulate where the carinae run to the margin. Eyes of moderate size, their maximum diameter 0·20–0·22 × HW and with 5–6 ommatidia in the longest row. With the head in full-face view the posterior margins of the eyes in front of the midlength of the sides. Antennal scapes relatively short (SI < 85), when laid straight back on the head the scapes obviously failing to reach the occipital margin. In full-face view the sides of the head evenly shallowly convex and broadest at about the midlength. Occipital margin very shallowly transversely concave. Promesonotal dorsum evenly convex, sloping posteriorly to the weakly impressed narrow metanotal groove. Propodeal dorsum and declivity forming a single smooth even convexity in profile. Propodeal spiracle small. Petiolar peduncle

short and stout, shorter than the height of the node. Subpetiolar process a large keel-like translucent lamella whose ventral margin is more or less straight. Dorsal surface of petiole node with a shallow median indentation. All dorsal surfaces of head and body with standing hairs present, the promesonotum with 6–7 pairs. Entirety of body smooth and shining, unsculptured except for cross-ribs at the metanotal groove. Colour glossy dark brown.

Known only from the short syntypic series, *lubricum* is distinguished from its relatives, *paternun* and *nuptualis*, by its very large and conspicuous subpetiolar process.

MATERIAL EXAMINED

South Africa: Transvaal, Marieskop (*J. C. Faure*).

Monomorium malatu nom. n.

Tetramorium altinode Santschi, 1935a: 266, fig. 10. Holotype worker, ZAIRE: Matadi, x.1920 (*L. Burgeon*) (MRAC) [examined]. [Junior secondary homonym of *M. altinode* Santschi, 1910: 359.]

Monomorium altinode (Santschi, 1935a) Bolton, 1980: 199. [Change of generic combination but without proposal of a replacement name.]

WORKER. TL 1·9–2·1, HL 0·42–0·52, HW 0·38–0·46, CI 88–92, SL 0·33–0·38, SI 80–85, PW 0·26–0·28, AL 0·50–0·54 (7 measured).

Prominent median section of anterior clypeal margin broad and subrectangular, the anterior margin transverse to shallowly concave between a pair of low broad slightly projecting angles which separate the anterior and lateral margins of the prominent median section of the clypeus. Clypeal carinae weakly developed, widely separated and subparallel, only slightly divergent anteriorly. Maximum diameter of eye 0·21–0·23 × HW and with 5–7 ommatidia in the longest row. With the head in full-face view the posterior margins of the eyes at the midlength of the sides and the scapes, when laid straight back, failing to reach the occipital margin. Head in full-face view short and broad (CI > 85), the sides slightly convex and the occipital margin transverse or very nearly so. Alitrunk in profile with promesonotum evenly domed-convex, highest at about the midlength and sloping evenly posteriorly to the weakly impressed metanotal groove. Propodeal dorsum with a short more or less horizontal section behind the metanotal groove; this is followed by a long shallow convex curve which slopes posteriorly and is confluent with the declivity proper. Propodeal spiracle small and pinhole-like. Node of petiole high and narrow in profile, cuneate, very narrowly rounded above; subpetiolar process a conspicuous flange. Postpetiole node slightly smaller than that of petiole, somewhat anteroposteriorly compressed and with a vertical anterior face. Postpetiole dorsum conspicuously more broadly rounded than petiole. In dorsal view both nodes transverse, very obviously broader than long. All dorsal surfaces of head and body densely clothed with short standing hairs, most or all of which are blunt or truncated apically, the promesonotum with 8–10 pairs. Head unsculptured except for hair-pits, some weak sculpture immediately behind the frontal lobes and a narrow sculptured track on the side of the head which connects the eye to the mandibular insertion. Sides of alitrunk densely reticulate-punctate everywhere except for the pronotum (which is mostly smooth) and a small clear patch in front of the propodeal spiracle. Metanotal groove with fine narrow cross-ribbing. Pronotal dorsum smooth; mesonotal dorsum mostly smooth but usually with some faint sculpture on extreme lateral portions; propodeum reticulate-punctate. Petiole and postpetiole nodes reticulate to reticulate-punctulate laterally; their anterior, dorsal and upper-posterior surfaces usually smooth. Gaster unsculptured except for hair-pits. Colour dark brown to blackish brown.

M. malatu is a very distinctive species, closest related to the much smaller *affabile*, the two being separated by both absolute and relative dimensions. These two share their characteristic cuneate petiole and high postpetiole with *dolatu*, but here the antennae have only 11 segments. More distantly all appear related to *disoriente* and *tanysum*; see the notes under the latter name.

MATERIAL EXAMINED

Zaire: Niangara (*N. A. Weber*); Matadi (*L. Burgeon*). **Uganda**: W. Buganda, Kayadondo, Kawand Res. Sta. (*D. N. McNutt*); Sabawali, Kigogwa (*D. N. McNutt*); Ankole, Igara, Bushenyi (*D. N. McNutt*). **Central African Republic**: Ubangi-shari, Haunt Mbomu (*N. A. Weber*).

Monomorium manir sp. n.

Holotype worker. TL 1·8, HL 0·48, HW 0·36, CI 75, SL 0·32, SI 89, PW 0·23, AL 0·48.

Clypeal carinae sharply defined and distinctly divergent anteriorly. Prominent median portion of clypeus with a pair of projecting low triangular denticles separating its anterior and lateral margins; the anterior margin shallowly concave between the denticles. Eyes relatively large and very conspicuous, their maximum diameter 0·31 × HW and with 7 ommatidia in the longest row. In profile the maximum diameter of the eye much greater than the shortest distance between the anteriormost point of the eye and the mandibular articulation. In full-face view the eyes distinctly in front of the midlength of the sides and the antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head very feebly convex in full-face view and the broad occipital margin slightly concave. Promesonotal dorsum only shallowly convex in profile, sloping posteriorly to the impressed but narrow metanotal groove. Metanotal cross-ribs short but conspicuous. Propodeal spiracle very small, pinhole-like. Petiole in profile with a short stout anterior peduncle and with an anteroventral process which consists of a small low lobe which tapers posteriorly, not reaching back to the level of the spiracle. Node of petiole narrow and subconical, higher than the postpetiole and noticeably more narrowly rounded above. Dorsal surfaces of head and body moderately clothed with standing hairs, the promesonotum with 4–5 pairs of which the longest are those at the pronotal humeri. Sculpture absent except for scattered minute hair-pits, metanotal short cross-ribs and some faint vestiges at about the mid-height of the mesopleuron. Colour shiny dark brown, the appendages and ventral surface of the head lighter.

Holotype worker, **Kenya**: Kora, Tana Riv., 1983, 0–100 m, no. 21, *Acacia-Commiphila* scrub (*N. M. Collins & M. Ritchie*) (BMNH).

Known from the holotype only, this small darkly coloured large-eyed species is related to *balathir*, *holothir* and *katir*. For separation of the four see the notes under *balathir*.

Monomorium mavide sp. n.

Holotype worker. TL 1·4, HL 0·38, HW 0·31, CI 82, SL 0·24, SI 77, PW 0·20, AL 0·38.

Clypeal carinae present and running to anterior margin. Maximum separation of carinae about equal to diameter of antennal socket, the carinae only very feebly divergent anteriorly. Anterior and lateral margins of prominent median portion of clypeus meeting in a blunt and obtuse angle, the margin without projecting angles or denticles at their junction. Anterior clypeal margin between apices of clypeal carinae transverse. Maximum diameter of eye 0·19 × HW and with 5 ommatidia in the longest row. In full-face view the eyes far in front of the midlength of the sides of the head. Antennal scapes relatively very short (SI < 80), when laid straight back from their insertions conspicuously failing to reach the occipital margin. Sides of head feebly convex in full-face view, head broadest behind the level of the eyes then narrowing somewhat to the occipital margin, which is extremely shallowly concave; head broader across the occiput than the clypeus. Head in profile with dorsal surface flat and ventral surface weakly convex. Anterior half of pronotum in profile convex but posterior half of pronotum and all of mesonotum flat, scarcely sloping towards the metanotal groove. Metanotal groove narrow and only shallowly impressed, the propodeal dorsum behind the groove more or less continuing the line of the promesonotum, then rounding broadly into the declivity. Propodeal spiracle very small, the metanotal cross-ribs short and only weakly developed. Petiole with a short stout anterior peduncle which is subtended by a narrow strip-like anteroventral process, the process truncated anteriorly. Node of petiole bluntly sub-conical, its ventral border convex and bulging. Postpetiole smaller, lower and more broadly rounded than petiole, its dorsum evenly domed-convex. All dorsal surfaces of head and body with standing hairs present, the promesonotum with 4–5 pairs. Sculpture absent except for minute hair-pits and metanotal cross-ribs. Head and gaster brown, the alitrunk light brownish yellow.

Paratype workers. TL 1·4–1·5, HL 0·38–0·40, HW 0·30–0·32, CI 79–82, SL 0·24–0·25, SI 75–80, PW 0·20–0·21, AL 0·38–0·40, (5 measured). As holotype but generally with alitrunk the same colour as the head.

Holotype worker, **South Africa**: Natal, Drakensberg, Giant's Castle, 2200 m, 1981 (*C. Peeters*) (BMNH).

Paratypes. 5 workers with same data as holotype (BMNH; MCZ).

M. mavide and *torvicte*, also from South Africa, form a very close pair of minute and apparently uncommon species within the *boerorum*-complex. The two are separated by the following characters.

mavide
Averaging smaller, HL 0·38–0·40, SL 0·24–0·25, HW 0·30–0·32.
Eyes slightly smaller (0·19 × HW) and subcircular in profile, only very little longer than wide.
Promesonotum flat behind anterior convexity, scarcely sloping to metanotal groove.
Clypeal carinae weakly divergent anteriorly.

torvicte
Averaging larger, HL 0·44–0·45, SL 0·25–0·28, HW 0·33–0·35.
Eyes slightly larger (0·20–0·21 × HW) and distinctly longer than wide in profile.
Promesonotum shallowly convex behind anterior convexity, sloping to metanotal groove.
Clypeal carinae conspicuously divergent anteriorly.

Monomorium mictilis Forel **stat. n.**

Monomorium (Martia) atomus subsp. *mictilis* Forel, 1910*d*: 252. Syntype workers, females, ETHIOPIA: Ghinda, Nefassit (*K. Escherich*) (MHN) [examined].
Monomorium (Lampromyrmex) exiguum st. *mictile* var. *sudanicum* Santschi, 1930*a*: 67, figs 22–24. Syntype workers, SUDAN: Koulouba (*Claveau*) (NMB) [examined]. [Unavailable name.]
Monomorium minutissimum Santschi, 1937: 225, figs 27, 28. Holotype worker, ANGOLA: Ebanga, 1932–33, no. 134 (*A. Monard*) (NMB) [examined: holotype with head missing.] **Syn. n.** (provisional).

WORKER. TL 1·2–1·3, HL 0·36–0·40, HW 0·26–0·30, CI 72–76, SL 0·20–0·26, SI 77–86, PW 0·16–0·19, AL 0·32–0·36 (10 measured).

Median portion of clypeus distinctly prominent and its anterior margin transverse to shallowly convex, sometimes with a minute indentation at the site of the median seta. Clypeal carinae weakly developed but present. Maximum diameter of eye 0·20–0·22 × HW. In general the eye when viewed in profile consisting of an outer ring of ommatidia encircling a single longitudinal row of only 2–3 ommatidia, but in some individuals one or two extra ommatidia may also be enclosed in the ring. Eye always distinctly longer than high and situated well in front of the midlength of the sides of the head. Antennae with 11 segments; the scape, when laid straight back from its insertion, conspicuously failing to reach the occipital margin. Head capsule in profile dorsoventrally flattened, the ventral surface approximately flat and not more convex than the dorsum. Promesonotal dorsum in profile flat or only extremely shallowly convex anteriorly, the metanotal groove only very weakly impressed. Propodeal dorsum convex and sloping posteriorly, the dorsum and declivity forming a single broadly convex surface. Propodeal spiracle small. Petiolar peduncle short and stout, subtended by a narrow strip-like and inconspicuous ventral process. Petiole node low and bluntly triangular in profile, distinctly larger than the much more broadly rounded postpetiole. Standing hairs present on all dorsal surfaces of the head and body, the promesonotal dorsum with only 3 pairs. Anterior margin of pronotum without a pair of elongate standing hairs between the distinctive pair at the pronotal humeri. Sculpture absent except for short metanotal cross-ribs. Colour dull yellow.

As presently constituted this minute species is identified by its size, arrangement of alitrunk pilosity and flattened head, in combination with the 11-segmented antennae. Of the names given above Santschi's unavailable *sudanicum* specimens are certainly conspecific with the *mictilis* type-series but the identity of *minutissimum* remains in some doubt as the holotype is headless.

M. mictilis has a wide distribution in the Afrotropical region. Material of the species is relatively scarce but I suspect that the individuals from Kenya, noted below, may eventually prove to be separate from the rest as they usually show one or two extra ommatidia in the eye. More collections are necessary to see if this variation occurs elsewhere in the range or is restricted to Kenyan populations, so for the present all the samples are retained as a single species.

MATERIAL EXAMINED

Ethiopia: Ghinda, Nefassit (*K. Escherich*). **Sudan**: Koulouba (*Claveau*). **Kenya**: Tana Riv. Distr., Gersen (*V. Mahnert & J.-L. Perret*); Galole, Hola (*V. Mahnert & J.-L. Perret*), **Zimbabwe**: Bulawayo (*G. Arnold*). **Angola**: Ebanga (*A. Monard*). **Namibia**: Ganab (*R. Leggott*).

Monomorium mirandum Arnold

Monomorium (Monomorium) mirandum Arnold, 1955: 734, fig. 2. Syntype workers, KENYA: Diani Beach, vii.1951 (*N. L. H. Krauss*) (MCZ) [examined].

WORKER. TL 1·8–1·9, HL 0·50–0·52, HW 0·38–0·39, CI 74–76, SL 0·38, SI 97–100 PW 0·26, AL 0·50–0·54, (3 measured).

Clypeal carinae conspicuous, widely separated and divergent anteriorly, terminating at the anterior clypeal margin in a pair of short but quite broad triangular denticles. Prominent median portion of clypeus with its margin transverse between the denticles, the latter distinctly separating the anterior and lateral margins. Maximum diameter of eye 0·21–0·23 × HW and with 6 ommatidia in the longest row. With the head in full-face view the posterior margins of the eyes distinctly in front of the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, just failing to reach the occipital margin; the latter shallowly concave. Promesonotal dorsum evenly convex in profile, conspicuously higher than the propodeum. Metanotal groove broadly impressed but metanotal cross-ribs very short, scarcely longer than the width of the minute pinhole-like propodeal spiracle. Propodeal dorsum highest immediately behind the metanotal groove, the surface then sloping posteriorly, feebly convex and rounding broadly and evenly into the declivity. Peduncle of petiole narrow, its ventral process reduced to an insignificant short ridge. Node of petiole high and narrow, triangular and tapering to a narrowly rounded point dorsally. Anterior and posterior faces of petiole node meeting in a sharp rim or edge, which is continuous around the sides and dorsum. Node of postpetiole very high and narrow, almost as high as petiole, tapering dorsally but more broadly rounded than the petiole node. Anterior face of postpetiole vertical, and laterally with the anterior and posterior faces meeting in a rim or edge, but this does not continue across the dorsum. All dorsal surfaces of head and body with standing hairs present, the promesonotum with 5–6 pairs. Sculpture absent except for scattered hair-pits and the short metanotal cross-ribs. Spectacularly bicoloured species. Head and its appendages, legs, and gaster bright yellow; alitrunk petiole and postpetiole blackish brown to black.

The very distinctive colour pattern of *mirandum* renders it immediately identifiable among the Afrotropical *Monomorium* fauna. The species belongs to the *altinode*-complex and the structure of its petiole and postpetiole indicates that it is closest related to the Ghanaian *vonatu*. The latter is uniformly black in colour and has much shorter scapes (SI 83).

MATERIAL EXAMINED

Kenya: Diani Beach (*N. L. H. Krauss*)

Monomorium musicum Forel

Monomorium oscaris subsp. *musicum* Forel, 1910*b*: 442. Syntype workers, female, SOUTH AFRICA: Natal no. 156 (*Haviland*) (MNH; BMNH) [examined].
Monomorium musicum Forel; Emery, 1922: 173. [Raised to species.]

WORKER. TL 1·6–1·7, HL 0·42–0·44, HW 0·32–0·33, CI 73–76, SL 0·26–0·27, SI 81–84, PW 0·20–0·22, AL 0·40–0·42 (3 measured).

Clypeal carinae narrow but sharply defined posteriorly, divergent anteriorly and tending to fade out before reaching the anterior margin. Prominent median portion of clypeus transverse on its anterior margin and with an obtuse angle separating the anterior and lateral margins, but without projecting teeth or denticles. Maximum diameter of eye 0·22–0·24 × HW and with 6 ommatidia in the longest row. With the head in full-face view the eyes very obviously far in front of the midlength of the sides. Antennal scapes, when laid straight back from their insertions, falling far short of the occipital margin. Sides of head shallowly convex and divergent posteriorly, so that the width of the head at the occipital margin is greater than its width immediately in front of the eyes. Occipital margin broad and weakly concave medially. Promesonotum in profile low, scarcely higher than the highest point of the propodeum. Dorsum of promesonotum more or less flat in profile, downcurved anteriorly to the cervix and posteriorly to the narrow and weakly impressed metanotal groove; the latter with few short inconspicuous cross-ribs. Propodeal dorsum highest immediately behind the metanotal groove, the dorsum then rounding evenly into the declivity through a broad smooth curve. Propodeal spiracle small. Petiole node low subconical in profile, with a short anterior peduncle which is subtended by a small subtriangular and flange-like anteroventral process. Postpetiole much smaller than petiole, its dorsum low and evenly convex. All dorsal surfaces of head and body with standing hairs, 3–4 pairs present on the promesonotum. Sculpture absent except for minute hair-pits and metanotal cross-ribs. Colour yellow, the head and gaster of some individuals with a faint brownish tint.

This minute species is superficially similar to *braunsi*, but in the latter the petiole node is very low and broadly convex dorsally, and the anterior peduncle of the node lacks a prominent anteroventral process. *M. torvicte*, a close relative of *musicum*, is uniformly dark brown and has shorter scapes and smaller eyes but is otherwise very similar indeed. I have treated these as separate species for the present but suspect that further collecting may nullify the apparent differences between them.

MATERIAL EXAMINED

South Africa: Natal (*Haviland*).

Monomorium noxitum sp. n.

HOLOTYPE WORKER. TL 2·1, HL 0·49, HW 0·40, CI 82, SL 0·42, SI 105, PW 0·27, AL 0·56.

Answering the description of *draxocum* holotype and with biconvex head as shown for *gabrielense* (Fig. 76). Differing from *draxocum* holotype by having 7 ommatidia in the longest facet-row of the eye. The metanotal cross-ribs are much more distinct laterally than in *draxocum* and are not confused with the strong reticulate-punctate sculpture of the mesopleuron. Head and alitrunk brown, with blackish brown gaster; legs scarcely lighter in shade than alitrunk.

PARATYPE WORKERS. TL 2·0–2·1, HL 0·46–0·50, HW 0·37–0·40, CI 79–82, SL 0·39–0·42, SI 103–105, PW 0·24–0·27, AL 0·54–0·58 (8 measured). As holotype but maximum diameter of eye 0·22–0·26 × HW (0·23 × HW in holotype) and with 6–7 ommatidia in the longest row.

Holotype worker, **Cameroun**: Nkoemvon, 1980 (*D. Jackson*) (BMNH)
Paratypes, 8 workers with same data as holotype (BMNH; MCZ; MHN)
Non-paratypic material examined. **Cameroun**: Mt Cameroun, Jonga (*M. Steele*).

Very closely related to *draxocum*, the two are separated as follows:

draxocum	**noxitum**
HL 0·39–0·42, HW 0·32–0·35.	HL 0·46–0·50, HW 0·37–0·40.
SL 0·32–0·36 (SI 100–109).	SL 0·39–0·42 (SI 103–105).
AL 0·44–0·46.	AL 0·54–0·58.
Maximum diameter of eye 0·21–0·24 × HW, with 5–6 ommatidia in longest row.	Maximum diameter of eye 0·22–0·26 × HW, with 6–7 ommatidia in longest row.
Legs very pale, conspicuously much lighter than alitrunk.	Legs only slightly lighter in colour than alitrunk.
Propodeal spiracle of moderate size.	Propodeal spiracle large.
Alitrunk very dark brown.	Alitrunk light brown.

Monomorium nuptualis Forel stat. n.

Monomorium oscaris var. *nuptualis* Forel, 1913*c*: 216. Syntype workers, ZIMBABWE: Bembesi, no. 146 (*G. Arnold*) (MHN) [examined].

WORKER. TL 1·8, HL 0·46, HW 0·36, CI 78, SL 0·32, SI 89, PW 0·24, AL 0·46 (one of two syntypes measured, head of second syntype crushed).

Clypeal carinae conspicuous, widely divergent anteriorly and running to the anterior margin. Prominent median portion of clypeus narrowly indented at site of median seta; the anterior margin of the prominent portion rounding into the lateral margins, the two not separated by sharp angles or projecting denticles. Maximum diameter of eye 0·22 × HW, with 5 ommatidia in the longest row. In full-face view the eyes far in front of the midlength of the sides and the scapes, when laid straight back from their insertions, failing to reach the occipital margin. Head subrectangular in full-face view, slightly narrower behind than in front and with a broad, medially concave occipital margin. With the alitrunk in profile the promesonotum forming a low shallow curve, the mesonotum sloping evenly and gradually backwards to the metanotal groove, not suddenly descending to meet it. Metanotal groove scarcely impressed, forming only the shallowest of indentations in the surface; metanotal cross-ribs very short and feeble. Propodeal dorsum shallowly convex, highest just behind the metanotal groove, then evenly downcurved posteriorly. Propodeal spiracle minute and pinhole-like. Petiole node thickly and bluntly subconical, the posterior face somewhat more convex than the anterior. Subpetiolar process a conspicuous anteroventral strip. Post-

petiole smaller, lower and more bluntly rounded than petiole in profile; in dorsal view both nodes appearing thickly subglobular. All dorsal surfaces of head and body with standing hairs, the syntypes somewhat abraded but the promesonotum probably with 4–5 pairs of hairs in life. Sculpture absent apart from minute hair-pits and the feeble metanotal cross-ribs. Colour glossy light brown to yellowish brown.

This species resembles a small, lighter coloured and relatively larger-eyes version of *paternum*, to which it is closely related.

MATERIAL EXAMINED
Zimbabwe: Bembesi (*G. Arnold*).

Monomorium occidentale Bernard

(Fig. 73)

Monomorium occidentale Bernard, 1952: 326, figs 10A-10E. LECTOTYPE worker, GUINEA: Ziéla Savano-To, 850 m (*Lamotte*) (MNHN) (here designated) [examined].

WORKER: TL 1·8–2·1, HL 0·48–0·54, HW 0·38–0·44, CI 76–81, SL 0·32–0·36, SI 80–87, PW 0·26–0·30, AL 0·50–0·60 (10 measured).

Clypeal carinae distinct, divergent anteriorly and the space between the carinae transversely shallowly concave. Anterior clypeal margin characteristically shaped and isolating the species from all other Afrotropical members of the group, being equipped with a pair of elongate narrow anteriorly projecting teeth at the corners of the prominent median portion of the clypeus. The teeth are usually slightly curved towards the midline and the anterior clypeal margin between them is conspicuously concave. Maximum diameter of eye 0·20–0·23 × HW and with 5–7 ommatidia in the longest row. In full-face view the eyes in front of the midlength of the sides. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin; the latter broad and shallowly concave. Promesonotum evenly shallowly convex in profile, sloping posteriorly to the narrow but distinctly indented metanotal groove. Metanotal cross-ribs short but conspicuous. Propodeal spiracle very large, dominating the side of the sclerite. Petiole in profile with a high narrow node and a small lobate anteroventral process on the short peduncle. Postpetiole with a vertical anterior face, not as high as the petiole and more broadly rounded above. All surfaces of head and body with numerous standing hairs, the promesonotum with 7 or more pairs and the propodeum usually with 5 pairs. Sculpture absent except for scattered minute hair-pits and metanotal cross-ribs. Some specimens with sculptured vestiges on the mesopleuron. Colour dark brown, the gaster tending to blackish brown in some.

The form of the clypeus in *occidentale* is reminiscent of the Madeiran *carbonarium*, but in the latter species the metanotal groove is broad and strongly cross-ribbed, the clypeal teeth are by no means as spectacularly developed, and the petiolar peduncle is relatively longer. The overall appearance of *occidentale* is that of a very specialized member of the *altinode*-complex, immediately isolated by the form of the clypeus and its teeth.

The above lectotype designation was rendered necessary by Bernard's inclusion of some workers referable to *invidium* in the type-series of *occidentale*. Those referable to *invidium* were Bernard's 'cotypes' from NE. Nimba (*Villiers*). Bernard's 'types' bearing the numbers F108, T125, T127, T128, T130, and the female T125 are now designated paralectotypes of *occidentale*.

MATERIAL EXAMINED
Sierra Leone: Njala (*F. A. Squire*); Njala (*E. Hargreaves*). **Guinea**: Ziéla (*Lamotte*).

Monomorium pacis Forel nomen dubium

Monomorium pacis Forel, 1915: 343. Holotype worker, SOUTH AFRICA: Cape Town (not in MHN or SAM, presumed lost).

Forel's description of this enigmatic species is too vague to allow even a guess at its correct placement. He says that *pacis* has something of the appearance of *Bondroita*, but other characters which he mentions indicate that the species is correctly placed in *Monomorium*.

Features which Forel stresses, which may be of value in recognizing this species, if it is ever rediscovered, include the following.

TL 1·9, smaller than *leimbachi* (a junior synonym of *rhopalocerum*). Profile of head subtruncate in front of the clypeus. Frontal carinae posteriorly forming a strong curve with their anterior lobe, which is situated on the subtruncate region. Eyes with about 15–20 ommatidia, situated on the anterior third of the sides of the head.

Monomorium pallidipes Forel **stat. n.**

Monomorium minutum var. *pallidipes* Forel, 1910*c*: 252. Syntype workers, Ethiopia: Nefassit (*K. Escherich*) (MHN) [examined].

Worker. TL 1·5, HL 0·41–0·42, HW 0·33–0·34, CI 79–81, SL 0·28–0·29, SI 83–88, PW 0·20–0·21, AL 0·39–0·40 (3 measured).

Clypeal carinae moderately well developed, clearly visible, reaching the anterior margin and strongly divergent anteriorly; the anterior margin and the carinae forming almost an equilateral triangle. Prominent median portion of clypeus broad and sharply defined, with a transverse to slightly concave anterior margin between the apices of the clypeal carinae and with an obtuse but conspicuous angle between the anterior and lateral margins. The clypeal carinae meet the anterior margin mesad of the angles separating anterior and lateral margins. Maximum diameter of eye 0·18–0·20 × HW, with 5 ommatidia in the longest row. With the head in full-face view the eyes distinctly in front of the midlength of the sides and the scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head straight to shallowly convex in full-face view, the occipital margin broad and shallowly concave. Head in profile dorsoventrally flattened, the dorsal and ventral surfaces only feebly convex. Promesonotum in profile low and shallowly convex, scarcely higher than the propodeum. Metanotal groove broadly but shallowly impressed, traversed by short but sharply defined cross-ribs. Propodeum highest immediately behind the metanotal groove where it is only slightly lower than the highest point of the promesonotum. Behind this the dorsum very shallowly convex and sloping posteriorly, then rounding broadly and evenly into the short declivity. Propodeal spiracle small and relatively high on the side. Petiole with a short stout anterior peduncle and a low broadly subconical node. Subpetiolar process an elongate narrow strip which runs back to a point just posterior to the level of the spiracle. Postpetiole smaller and lower than the petiole, more broadly rounded above. All dorsal surfaces with standing hairs, the promesonotum with 5 pairs. Sculpture absent except from the metanotal cross-ribs and minute scattered hair-pits. Colour uniform medium to dark brown.

This small dark Ethiopian species is known only from the type-series. Although related to *monomorium* (=*minutum*) it is distinctly different in the construction of the clypeus, shape of the alitrunk and form of the petiole and its ventral process. In *monomorium* the prominent median portion of the anterior clypeus is narrow and distinctly notched or indented, the propodeum is shorter and more strongly convex, and the subpetiolar process is a small lobe. The real affinities of *pallidipes* lie with *leopoldinum*, and its Afrotropical allies.

Material examined

Ethiopia: Neffasit (*K. Escherich*).

Monomorium paternum sp. n.

(Fig. 89)

Monomorium oscaris r. *springvalense* var. *paterna* Forel, 1914: 248. Holotype worker, South Africa: Cape Prov., Table Mt, no. 300 (*G. Arnold*) (MHN) (examined). [Unavailable name.]

Holotype worker. TL 2·3, HL 0·53, HW 0·44, CI 83, SL 0·36, SI 82, PW 0·28, AL 0·56.

Clypeal carinae moderately developed, widely separated posteriorly, outcurved, strongly divergent and petering out anteriorly. Prominent median portion of clypeus broad, its anterior margin concave in the middle of its width, the concavity not extending to the anterolateral angles of the prominent median portion of clypeus. Anterior and lateral margins of prominent median portion of clypeus separated by a broad blunt angle, without projecting angles or denticles of any description. Maximum diameter of eye 0·18 × HW and apparently with 5–6 ommatidia in the longest row. The actual number is difficult to discern as both eyes of the holotype are concave centrally. Whether this feature occurs in live individuals or is an artifact of preservation is not known. With the head in full-face view the eyes well in front of the midlength of the sides and the scapes, when laid straight back, failing to reach the occipital margin. Sides of head

behind eyes shallowly convex and feebly convergent posteriorly, rounding into the broad and shallowly concave occipital margin. Head dorsoventrally flattened, in profile only weakly biconvex. Promesonotum only feebly convex, sloping posteriorly to the narrow and shallowly impressed metanotal groove. Propodeum feebly convex, sloping posteriorly and the dorsum rounding broadly and evenly into the declivity. Propodeal spiracle small. Petiole with a short stout anterior peduncle which is equipped below with a broad translucent strip-like process. Postpetiole node smaller than petiole in profile, in dorsal view both nodes broader than long. Holotype abraded but all dorsal surfaces apparently with standing hairs present, the promesonotum probably with 4–5 pairs in life. Entire body smooth and shining, lacking sculpture except for minute hair-pits and metanotal cross-ribs. Colour glossy medium to dark brown.

Holotype worker, **South Africa**: Cape Prov., Table Mt, no. 300 (*G. Arnold*) (MHN).

Known only from the holotype, this medium-sized species appears closest related to *lubricum* and *nuptualis*. The former is distinguished by its much more massively developed subpetiolar process. The latter is a smaller species with a relatively longer head, longer scapes and smaller eyes.

Monomorium pulchrum Santschi

Monomorium (Lampromyrmex) pulchrum Santschi, 1926*a*: 238, fig. 3A. Syntype workers, Zimbabwe: Sawmills, 27.xii.1923 (*G. Arnold*) (BMNH; MCZ) [examined].

Worker. TL 1·7–1·9, HL 0·44–0·48, HW 0·36–0·38, CI 78–82, SL 0·32–0·34, SI 87–92, PW 0·22–0·26, AL 0·50–0·54 (8 measured).

Clypeal carinae finely but sharply developed, widely separated and strongly divergent anteriorly. Anterior clypeal margin transverse to feebly convex between the apices of the carinae. Anterior and lateral faces of the projecting median portion of the clypeus separated by an obtuse angle, without projecting teeth. Fourth (basal) tooth of mandible much smaller than the third, reduced to a denticle. Maximum diameter of eye 0·18–0·21 × HW and with 5–6 ommatidia in the longest row. Outer ring of ommatidia enclosing more than one transverse row. In full-face view the eyes conspicuously in front of the midlength of the sides. Antennae with 11 segments; the antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. In full-face view the occipital margin very feebly concave medially. Promesonotum evenly shallowly convex in profile, the metanotal groove broad, deeply impressed and traversed by sharply defined ribs. Propodeal dorsum convex, highest approximately above the level of the small pinhole-like spiracle. Posteriorly the dorsum rounding broadly into the declivity. Petiole node high and quite narrowly subconical in profile, narrowly rounded above. Subpetiolar process a narrow longitudinal strip, the ventral margin of the petiole node shallowly convex behind the process but not strongly bulging downwards. Postpetiole in profile approximately as voluminous as the petiole, almost as high but distinctly more broadly rounded above. Anterior face of postpetiole shallowly convex, the posterior face much longer than the anterior and more or less flat in profile, sloping at about 45°. In dorsal view both nodes distinctly broader than long, the postpetiole broader than the petiole. All dorsal surfaces of head and body with conspicuous fine standing hairs, the promesonotum with 6–7 pairs and the propodeum with 2–3 pairs. Sculpture absent except for metanotal cross-ribs and some faint shagreening on the pleurae. Colour of head and alitrunk glossy dull yellow to pale brown, the gaster somewhat darker brown.

M. pulchrum is closest related to the darker coloured *bequaerti* from Zaire. Of the species with 11 antennal segments these two form a close complex with *rosae*, a common West and Central African form which is blackish brown to black in colour. *M. pulchrum* separates from *bequaerti* by colour and size, and by the fact that the nodes of both petiole and postpetiole are longer than broad in dorsal view in *bequaerti*, both broader than long in *pulchrum*.

Material examined

Zimbabwe: Sawmills (*G. Arnold*); Bulawayo (*G. Arnold*)

Monomorium rastractum sp. n.

Holotype worker. TL 1·9, HL 0·50, HW 0·37, CI 74, SL 0·34, SI 92, PW 0·24, AL 0·50.

Clypeal carinae widely separated, strongly divergent anteriorly, terminating at the anterior margin in a pair of low, relatively broad projecting angles. Prominent median portion of clypeus with its anterior margin extremely feebly concave between the projecting angles, the latter separating its anterior and lateral margins. Eyes relatively large, 0·27 × HW and with 7 ommatidia in the longest row. In full-face view

the large eyes conspicuously in front of the midlength of the sides. Antennal scapes, when laid straight back from their insertions, distinctly failing to reach the occipital margin. Sides of head shallowly convex behind the eyes and somewhat convergent posteriorly. Occipital margin shallowly concave medially. Promesonotal dorsum in profile shallowly convex, highest at about the midlength of the pronotum, the posterior half of the pronotum and the entire mesonotum forming a gradual slope to the metanotal groove; the latter only weakly and quite narrowly impressed. Metanotal cross-ribs short but conspicuous. Propodeal spiracle minute and pinhole-like. Propodeal dorsal outline forming a single even long convexity in profile, without obvious division into dorsum and declivity. Petiole node in profile small, low and subconical, with a low lobe-like anteroventral process which tapers out posteriorly. Postpetiole smaller than petiole, slightly more broadly rounded above. All dorsal surfaces of head and body with standing hairs, the promesonotum with 6–7 pairs. Sculpture absent except for scattered minute hair-pits and metanotal cross-ribs. Colour yellow.

Holotype worker, **Kenya**: Tana Riv., Kora, 0–100 m, no. 5, 1983, *Acacia-Commiphila* scrub (*N. M. Collins & M. Ritchie*) (BMNH).

A very distinctive species with relatively large eyes, *rastractum* combines the clypeal structure of the *altinode*-complex with the petiole form of the *leopoldinum*-complex and appears to represent an intermediate between these two informal groups. The outline shape of the alitrunk in *rastractum* is very similar to that of *fugelanum* (Fig. 88), but the petiole is lower, much smaller and more obviously conical. The postpetiole lacks the high vertical anterior face shown by *fugelanum* and its allies in the *altinode*-complex. Within the *leopoldinum*-complex *rastractum* is closest related to *borlei* and *springvalense*, but the former has a large propodeal spiracle and only 3 pairs of standing hairs on the promesonotum. The latter also has only 3–4 pairs of standing hairs on the promesonotum, and has a broader head and relatively smaller eyes than *rastractum*, 0·21–0·23 × HW as opposed to 0·27 × HW.

Monomorium rhopalocerum Emery

(Fig. 81)

Monomorium rhopalocerum Emery, 1895*b*: 25, pl. 2, fig. 29. Syntype workers, South Africa: Cape Town (*E. Simon*) (MCSN) [examined].

Monomorium minutum subsp. *hottentota* Emery, 1895*b*: 26. Syntype females (dealate), South Africa: Cape Town (*E. Simon*) (MCSN) [examined]. **Syn. n.** (provisional).

Monomorium leimbachi Forel, 1914: 246. Syntype workers, South Africa: Cape Town, 1913, No. 336 (*G. Arnold*) (MHN) [examined]. **Syn. n.**

Worker. TL 2·0–2·2, HL 0·53–0·60, HW 0·42–0·50, CI 79–83, SL 0·36–0·44, SI 83–90, PW 0·26–0·30, AL 0·55–0·60 (15 measured).

Anterior margin of prominent median portion of clypeus transverse to shallowly concave, rounding into the lateral margin; the two margins not separated by acute angles or projecting triangular denticles. Clypeal carinae narrow but sharply developed, the space between them extremely shallowly transversely concave. Clypeal carinae relatively close together posteriorly and subparallel, feebly diverging anteriorly. Eyes relatively small, their maximum diameter 0·18–0·21 × HW and with 6–7 ommatidia in the longest row. In full-face view the eyes conspicuously in front of the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head behind eyes approximately parallel, only extremely weakly convex and feebly convergent posteriorly. Occipital margin broad and usually very weakly and shallowly concave, at least medially. Promesonotal dorsum evenly broadly and shallowly convex in profile, sloping posteriorly to the broadly impressed metanotal groove. Metanotal cross-ribs relatively long and strong, conspicuous. Propodeal dorsum sloping posteriorly, rounding broadly and evenly into the declivity. Propodeal spiracle small. Subpetiolar process a narrow inconspicuous rim. Node of petiole in profile low and broad, broadly rounded above. Postpetiole much smaller than petiole, lower and its dorsal and anterior surfaces forming a single convexity. All dorsal surfaces of head and body with standing hairs, the promesonotum with 4–5 pairs. Mesopleuron shagreenate to finely reticulate in larger workers, partly smooth in small individuals. Sculpture otherwise absent except for scattered hair-pits and the conspicuous metanotal cross-ribs. Colour dull yellow, the gaster sometimes with a brownish tint.

M. rhopalocerum is closely related to *exchao*, *binatu* and *symmotu*; and more distantly to *tablense*. Of these five *binatu* has relatively long scapes (SI 100–105) which reach back to the occipital margin. Both

binatu and *tablense* contrast with the remainder as their petiole nodes are relatively high and narrow (Figs 78, 80) as opposed to the broader lower nodes seen in the other three (Figs 77, 79, 81). *M. rhopalocerum* is larger than *exchao* and *symmotu*, and has a relatively broader head, but relative size of eyes and length of scapes fall into the same range in all three, though the scapes of *rhopalocerum* average a fractionally lower SI.

	HW	CI	SL	SI	Diameter of eye
rhopalocerum	0·42–0·50	79–83	0·36–0·44	83–90	0·18–0·21 × HW
symmotu	0·36–0·39	74–76	0·34–0·35	89–94	0·20–0·23 × HW
exchao	0·37–0·38	74–76	0·34	89–91	0·20–0·21 × HW

Apart from the dimensions *symmotu* differs from *rhopalocerum* by having the propodeal outline more evenly convex and more strongly convex immediately behind the metanotal groove. In *exchao* the propodeum behind the groove is more strongly raised in profile and passes through a much narrower curve into its posterior slope towards the declivity; compare Figs 77, 81.

In the synonymy quoted above *hottentota* is given as provisional. This is because the type-series of *rhopalocerum* is based on workers and that of *hottentota* on females. I have not seen any samples which contain both females and workers but the overall marked similarity between these two short series, and the fact that both show the same data, leads me to suspect that they originated in a single series that was somehow later split up. *M. leimbachi* is an absolute synonym of *rhopalocerum*.

MATERIAL EXAMINED

South Africa: Cape Town (*M. C. Day*); Cape Town (*G. Arnold*); Cape Town (*E. Simon*); E. Cape Prov., Hogsback (*W. L. Brown*).

Monomorium rosae Santschi

Monomorium (*Lampromyrmex*) *rosae* Santschi, 1920*b*: 13, figs 2c–f. Syntype workers, ZAIRE: Boma, 7.ix.1913, No. 36 (*Bequaert*) (MRAC, NMB) [examined].

Diplomorium cotterelli Donisthorpe, 1942*b*: 217. Holotype and paratype workers, GHANA: E. P., Tafo, xii.1940, No. 1370 (*G. Cotterell*) (BMNH) [examined]. **Syn. n.**

WORKER. TL 1·6–2·0, HL 0·42–0·50, HW 0·33–0·40, CI 76–82, SL 0·28–0·35, SI 85–94, PW 0·21–0·25, AL 0·42–0·56 (12 measured).

Clypeal carinae only feebly developed but quite distinct, widely separated and divergent anteriorly. Median portion of clypeus with anterior margin transverse or even weakly convex, the anterior and lateral borders of the prominent median section of the clypeus meeting in an obtuse angle, without projecting angles or denticles. Basal (fourth) tooth of mandible much smaller than the third, reduced to a denticle. Maximum diameter of eye 0·19–0·23 × HW and with 5–6 ommatidia in the longest row. Outer ring of ommatidia encircling more than one longitudinal row. Eyes in full-face view distinctly in front of midlength of sides of head. Antennae with 11 segments, the scapes when directed straight back from their insertions failing to reach the occipital margin. Promesonotum in profile shallowly convex, the metanotal groove shallowly impressed and traversed by short but conspicuous cross-ribs. Propodeal spiracle small and pinhole-like. Propodeal dorsum in profile convex immediately behind the metanotal groove; this followed by a posteriorly sloping section which is feebly convex or almost flat, and which rounds posteriorly into the much more steeply sloping declivity. Petiole in profile with the node subconical, broad basally and rapidly tapering to a narrowly rounded apex; the node bluntly wedge-shaped. Subpetiolar process a narrow, sometimes vestigial, longitudinal strip; ventral outline of petiole node behind the process feebly convex but not strongly bulging ventrally. Node of postpetiole in profile about equal in volume to that of the petiole, or slightly less; much more broadly rounded dorsally than the petiole. Anterior face of postpetiole in profile shorter and conspicuously steeper than the long gradually sloping posterior face. In dorsal view both nodes broader than long. Standing hairs present on all dorsal surfaces of head and body, with 4–6 pairs on the promesonotum and 2–3 pairs on the propodeum. Sculpture absent except for metanotal cross-ribs and some shagreening or reticulation on the pleurae. Colour glossy blackish brown to black.

A widely distributed species which shows variation in size and pilosity over its range. Analysis of *rosae* when more material is available may well show that 2–3 sibling species are involved here. For the present all samples are treated as a single species, easily identified by its 11-segmented antennae, dark colour, moderately long scapes and distinctively shaped postpetiole node (as Fig. 92). The shape of the postpetiole

is shared only with *pulchrum* and *bequaerti* among species with 11 antennal segments, but both of these are lighter in colour. Apart from this the petiole and postpetiole nodes are broader than long in dorsal view in *rosae* and *pulchrum*, but longer than broad in *bequaerti*. *M. pulchrum* has the propodeal dorsum quite evenly and continuously convex in profile, which is not the case in *rosae* where a flattened or depressed mid-dorsal section is conspicuous.

The two syntype workers of *rosae* are lighter in colour than all the remaining material examined, but I strongly suspect that they had not attained full adult colour when captured, and have faded somewhat since then.

MATERIAL EXAMINED

Senegal: Noto (*C. Agbogba*). **Ghana**: Tafo (*G. F. Cotterell*); Tafo (*B. Bolton*); Mole (*J. C. Grieg*); Mampong (*P. Room*); Maase (*D. Leston*); Legon (*D. Leston*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*); Ibadan (*B. Critchley*); Mokwa (*C. Longhurst*). **Zaire**: Boma (*Bequaert*); Luhoho, Riv. Bunyakiri (*E. S. Ross & R. E. Leech*). **Kenya**: Embu (*V. Mahnert & J.-L. Perret*).

Monomorium rotundatum Santschi

Monomorium (*Lampromyrmex*) *rotundatum* Santschi, 1920*b*: 14, fig. 2a. Syntype workers, SOUTH AFRICA: Natal, Durban, 4.v.1914, ex coll. Arnold (*H. B. Marley*) (NMB) [examined].

WORKER. TL 1·7–2·0, HL 0·44–0·48, HW 0·34–0·38, CI 77–81, SL 0·28–0·30, SI 79–83, PW 0·20–0·24, AL 0·44–0·52 (8 measured).

Clypeal carinae narrowly but quite strongly developed, divergent anteriorly. Anterior clypeal margin transverse to shallowly convex between the anterior points of the clypeal carinae. Eyes relatively small, their maximum diameter 0·18–0·19 × HW. Eye in profile seen to consist of an outer ring of ommatidia which encircles a single short longitudinal row, the encircled row of only 2–3 ommatidia so that the eye is only slightly longer than high. In full-face view the eye conspicuously in front of the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Promesonotum only shallowly convex in profile, the metanotal groove weakly and shallowly impressed. Propodeal spiracle small and pinhole-like. Petiole with a short stout anterior peduncle. Subpetiolar process a longitudinal strip which narrows posteriorly until it runs into the convex ventral border of the petiole node itself. Node of petiole low and broadly subconical in profile, bluntly rounded dorsally. Postpetiole smaller than petiole and dorsally much more broadly and shallowly convex. Standing pilosity sparse, showing signs of abrasion in all material examined, but apparently with 4–5 pairs on the promesonotum and a single pair on the propodeum. Sculpture absent except for short but distinct metanotal cross-ribs. Colour yellow, the apex of the first gastral tergite traversed by a band of brown, which may be indistinct in older samples.

In the original description Santschi placed *rotundatum* in the spurious subgenus *Lampromyrmex*, thus implying that the antennae had 11 segments. The antennae are poorly displayed in the three extant syntypes of this species, but those which are visible show 12 segments.

Of the six known African species which combined 12-segmented antennae with the characteristic form of eye described above, *rotundatum* is diagnosed by its pilosity, colour, eye size and scape length. Comparative measurements of the six species are as follows.

	HW	CI	SI	Diameter of eye
floricola	0·33–0·37	75–80	86–94	0·21–0·24 × HW
shilohense	0·30–0·34	77–81	80–85	0·23–0·24 × HW
sryetum	0·32	76	84	0·25 × HW
inquietum	0·38	83	76–79	0·16 × HW
rotundatum	0·34–0·38	77–81	79–83	0·18–0·19 × HW
trake	0·30	79	73	0·17–0·18 × HW

A single specimen from Kenya (in MCZ) is tentatively placed in *rotundatum* as all salient features match those of the South African material seen, but the petiole and postpetiole of the Kenyan specimens are obscured by glue.

MATERIAL EXAMINED

South Africa: Natal, Durban (*H. B. Marley*); Durban (*C. B. Cooper*).

Monomorium schultzei Forel

Monomorium schultzei Forel, 1910*c*: 18. Syntype workers, female, South Africa: Cape Prov. (Klein-Namaland), Steinkop (*L. Schultze*); Namibia: Prince of Wales Bay, Angra Pequena (*L. Schultze*) (MHN) [examined].

Worker. TL 2·0–2·2, HL 0·54–0·58, HW 0·42–0·46, CI 77–80, SL 0·42–0·46, SI 97–102, PW 0·25–0·30, AL 0·54–0·60 (10 measured).

Clypeal carinae sharply developed, close together and subparallel, at most only weakly divergent anteriorly. Area of clypeus between the carinae concave and the anterior clypeal margin between the apices of the carinae concave. Prominent median section of clypeus narrow, its anterior and lateral margins separated by an angle which may be sharp, but without projecting denticles. Eyes relatively large, maximum diameter 0·24–0·27 × HW and with 7–8 ommatidia in the longest row. In full-face view the posterior margins of the eyes at the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, just reaching the occipital margin. Sides of head behind eyes shallowly convex, the occipital margin broadly and shallowly concave. Major features of head very similar to that of *excensurae*, Fig. 61. Promesonotum in profile convex, its highest point in front of the promesonotal midlength and on a much higher level than the propodeum. Mesonotum sloping posteriorly and its outline almost flat. Metanotal groove very narrow and only feebly impressed, traversed by short and inconspicuous cross-ribs. Propodeal dorsum sloping posteriorly, the spiracle minute and pinhole-like. Petiole in profile with an elongate narrow peduncle which is subtended by a small lobiform anteroventral process. Node of petiole narrow and subconical, narrowly rounded above. Postpetiole smaller, lower and more broadly rounded than petiole. In general the shape of the petiole and postpetiole is similar to that seen in *excensurae* (Fig. 75) but the subpetiolar process is smaller and the node slightly narrower. Viewed from above the dorsal surfaces of both nodes are distinctly broader than long. All dorsal surfaces of head and body with standing hairs, the promesonotum with 5–6 pairs. Sculpture absent except for scattered minute hair-pits, the feeble metanotal cross-ribs and some meso- and metapleural vestiges. Colour predominantly yellow but the cephalic dorsum and gastral tergites duller and with a pale brownish yellow tint in some.

M. schultzei is closest related to *excensurae* and *bevisi*. The last named is a larger and more densely hairy species, and it is also distinctly darker in colour. Differences between *schultzei* and *excensurae* are discussed under the latter name.

Material examined

South Africa: Cape Prov., Lower Albany, Grahamstown (*J. Hewitt*); Grahamstown (*G. Baines & E. M. Cherry*); Steinkop (*L. Schultze*). **Namibia**: Angra Pequena (*L. Schultze*). **Lesotho**: Roma (*R. L. Ghent*).

Monomorium shilohense Forel **stat. n.**

Monomorium braunsi var. *shilohensis* Forel, 1913*c*: 217. Syntype workers, Zimbabwe: Shiloh, 10.v.1913, no. 173 (*G. Arnold*) (BMNH; MHN) [examined].

Worker. TL 1·5–1·6, HL 0·38–0·44, HW 0·30–0·34, CI 77–81, SL 0·24–0·28, SI 80–85, PW 0·19–0·23, AL 0·42–0·46 (5 measured).

Anterior clypeal margin transverse to feebly concave between the apices of the weakly developed clypeal carinae, the latter distinctly divergent anteriorly but not terminating in teeth or projecting angles. Instead the anterior margin and lateral margins of the projecting median section of the clypeus meet in obtuse angles. Maximum diameter of eye 0·23–0·24 × HW. In profile the eye conspicuously longer than high, the ommatidia arranged as an outer ring which encircles a single inner longitudinal row. The encircled row consists usually of 3 ommatidia but rarely 4 may be present. In full-face view the eyes distinctly in front of the midlength of the sides and the scapes, when laid straight back from their insertions, fail to reach the occipital margin. Promesonotum shallowly convex, almost flat posteriorly, sloping to the metanotal groove which is shallow and almost unimpressed. Propodeal dorsum continues the slope of the posterior mesonotum and the propodeal spiracle is minute and pinhole-like. Peduncle of petiole short and subtended by a short but deep and conspicuous process. Petiole node low and broadly subconical, its ventral surface distinctly bulging and convex; the subpetiolar process is confluent with this bulge. Postpetiole low and rounded, smaller than the petiole. All available specimens are abraded but the promesonotum apparently has 3–4 pairs of standing hairs and the propodeum one pair. The head, petiole, postpetiole and gaster also have standing hairs present. Head and body without sculpture except for metanotal cross-ribs and some weak granular sculpture on the mesopleuron. Colour yellow throughout, the apical half of the first gastral tergite without a transverse brown band.

One of only six species in the region to combine 12-segmented antennae with the characteristic eye form described above. *M. shilohense* is separated from the other five by its colour, the shape and size of its eyes, and its pilosity. In *sryetum* the dorsal alitrunk has only a single pair of standing hairs, at the pronotal humeri, whilst all the others have more than one pair. *M. trake* and *rotundatum* have small eyes (0·17–0·19 × HW as opposed to 0·21–0·25 × HW elsewhere) which appear almost circular in profile, being only fractionally longer than high rather than distinctly elongate and narrow as seen in the remaining four species. In *inquietum* and *trake* the anterior clypeal margin is evenly convex, lacking the differentiated prominent median portion developed by the other four species. In *floricola* and *inquietum* the head is conspicuously brown in colour, whereas it is yellow in the remaining four species.

MATERIAL EXAMINED

Zimbabwe: Shiloh (*G. Arnold*); Hillside, Bulawayo (*G. Arnold*).

Monomorium spectrum sp. n.

HOLOTYPE WORKER. TL 1·3, HL 0·34, HW 0·28, CI 82, SL 0·22, SI 79, PW 0·17, AL 0·36.

Median portion of clypeus distinctly projecting anteriorly, its anterior margin transverse to extremely feebly concave and separated from the lateral margins by an obtuse angle; the margin lacking projecting angles or teeth where they meet. Clypeal carinae only weakly developed, almost effaced, widely separated and divergent anteriorly. Maximum diameter of eye 0·21 × HW, in profile the eye consisting of an outer ring of ommatidia which encloses a single transverse row of only two ommatidia; the maximum diameter of the eye with 4 ommatidia in the only longitudinal row. Eyes in full-face view distinctly in front of the midlength of the sides. Antennae with 11 segments. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Promesonotum in profile having an evenly convex low but broad dome-like outline. Metanotal groove distinctly impressed, traversed by short but conspicuous cross-ribs. Propodeal dorsum convex but its highest point on a much lower level than that of the promesonotum, the dorsum rounding very broadly and evenly into the posteriorly sloping declivity. Propodeal spiracle small, not dominating the side of the sclerite. Petiole with a short and quite stout anterior peduncle which is subtended by a small longitudinal ventral process. Ventral outline of node behind level of process conspicuously convex. Petiole node bluntly subconical in profile, larger than the postpetiole but the latter somewhat more broadly rounded above. All dorsal surfaces of body with standing hairs present, the promesonotum with 5–6 pairs. Sculpture absent except for metanotal cross-ribs. Head and body a uniform rich dark brown, the legs extremely pale, off-white to bone-white and contrasting very strongly with the body.

PARATYPE WORKERS. TL 1·2–1·3, HL 0·32–0·36, HW 0·26–0·29, CI 80–82, SL 0·20–0·22, SI 76–79, PW 0·16–0·18, AL 0·34–0·37 (10 measured). As holotype but maximum diameter of eye 0·19–0·21 × HW.

Holotype worker, **Gabon**: Makokou, x.1972 (*I. Lieberburg*) (MCZ).

Paratypes. **Gabon**: 8 workers with same data as holotype; 4 workers, Plateau d'Ipassa 9, IPA AN4 (*J. A. Barra*) (MCZ; BMNH).

Among the Afrotropical species with 11-segmented antennae the distinctive and striking colour contrast between body and legs makes *spectrum* immediately recognizable.

Monomorium speluncarum Santschi stat. n.

Monomorium rhopalocerum st. *speluncarum* Santschi, 1914*a*: 72, fig. 6. Syntype workers, KENYA: Shimoni, st. no. 9, xi.1911, 'entrée de la grotte A' (*Alluaud & Jeannel*) (NMB) [examined].

WORKER. TL 1·6–1·7, HL 0·40–0·42, HW 0·31–0·32, CI 75–76, SL 0·33–0·34, SI 106–107, PW 0·20–0·22, AL 0·42–0·44 (3 measured).

Clypeal carinae fine and sharp, close together and subparallel, only slightly divergent anteriorly. Prominent median portion of clypeal margin narrow, its anterior margin separated from its lateral margins only by blunt to rounded angles; without projecting angles or denticles. Maximum diameter of eye 0·22 × HW and with 4–5 ommatidia in the longest row. With the head in full-face view the eyes situated just in front of the midlength of the sides, the posterior margins of the eyes approximately at the midlength. Antennal scapes, when laid straight back from their insertions, reaching the occipital margin; the scapes relatively long, SI > 105. Occipital margin of head broad and shallowly concave in full-face view, the sides very feebly convex. Promesonotal dorsum evenly convex in profile, high, on a much higher level than the

propodeum. Extreme posterior portion of mesonotum suddenly downcurved and descending steeply to the broad, deep, strongly cross-ribbed metanotal groove. Propodeal dorsum short and rounding abruptly into the declivity, the two surfaces about equal in length. Propodeal spiracle minute, pinhole-like. Petiole node large and broadly subconical, narrowly rounded above. Postpetiole smaller and lower than petiole, more broadly and evenly rounded. All dorsal surfaces of head and body with standing hairs, the promesonotum with 4 pairs and the propodeum with 2 pairs. Sculpture restricted to faint granulation on the mesopleuron and the long strong cross-ribs of the metanotal groove, remainder of body smooth and featureless except for hair-pits. Colour uniform pale yellow.

Within the *schultzei*-complex *speluncarum*, apart from being the smallest known species, has the unique combination of minute spiracle and broad metanotal groove. In the complex the various combinations of these two characters are as follows.

Propodeal spiracle large and dominating the sclerite, plus metanotal groove broad and traversed by long strong cross-ribs: *arboreum*, *vecte*, *crawleyi*, *firmum*, *kineti* (Figs 64, 65, 67–69).
Propodeal spiracle minute and pinhole-like, plus metanotal groove very narrow and traversed by short feeble cross-ribs: *bevisi*, *excensurae*, *schultzei* (Fig. 75).
Propodeal spiracle minute and pinhole-like, plus metanotal groove broad and traversed by long strong cross-ribs: *speluncarum*.

Material examined
Kenya: Shimoni (*Alluaud & Jeannel*).

Monomorium springvalense Forel

Monomorium oscaris r. *springvalense* Forel, 1913*b*: 136. Syntype workers, Zimbabwe: Springvale 6.x.1912, no. 111 (*G. Arnold*) (BMNH; MHN) [examined].
Monomorium (Monomorium) springvalense Forel; Santschi, 1937: 225. [Raised to species.]

Worker. TL 2·0–2·1, HL 0·50–0·52, HW 0·40–0·41, CI 77–80, SL 0·36–0·37, SI 90, PW 0·26–0·30, AL 0·53–0·58.

Clypeal carinae sharply developed and conspicuous; widely divergent anteriorly. Anterior margin of prominent median portion of clypeus transverse to shallowly concave, usually with a feebly crenulate appearance. The anterior margin is bounded on each side by a low triangular prominent angle at the apex of each clypeal carina, the projecting angle separating the anterior and lateral margins of the median portion of the clypeus. Maximum diameter of eye 0·22–0·23 × HW and with 6–7 ommatidia in the longest row. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. With the head in full-face view the eyes situated conspicuously in front of the midlength of the sides; the sides behind the eyes weakly convex and the broad occipital margin shallowly concave medially. Promesonotum evenly shallowly convex in profile, sloping posteriorly to the narrow and only weakly impressed metanotal groove. Metanotal cross-ribs short but distinct. Propodeal spiracle of moderate size, not reduced to a mere pinhole nor very large and dominating the side of the sclerite. Propodeal dorsum rounding broadly and evenly into the declivity. Subpetiolar process a small anteroventral lobe which peters out posteriorly. Node of petiole in profile quite thickly subconical, the anterior and posterior faces both very fully convex and the node bluntly rounded above. Postpetiole smaller and lower than petiole, more broadly rounded dorsally but with relatively steep anterior and posterior faces, both of which are nearly vertical. Standing hairs present on all dorsal surfaces but relatively sparse on the alitrunk; the promesonotum with only 4 pairs. Sculpture entirely absent except for scattered hair-pits and metanotal cross-ribs. Alitrunk yellow, the head and gaster with a brownish tint; usually the gaster slightly darker in shade than the head.

M. springvalense is very closely related to *borlei* within the *leopoldinum*-complex but the two are separated by the darker colour, larger propodeal spiracle and even sparser pilosity of the latter.

Material examined
Zimbabwe: Springvale (*G. Arnold*).

Monomorium sryetum sp. n.

HOLOTYPE WORKER. TL 1·5, HL 0·42, HW 0·32, CI 76, SL 0·27, SI 84, PW 0·21, AL 0·44.

Median portion of clypeus with its anterior margin transverse between the apices of the clypeal carinae, the latter weakly developed but strongly divergent anteriorly. Anterior and lateral margins of projecting median portion of clypeus meeting in obtuse angles, without prominent denticles where they meet. Maximum diameter of eye 0·25 × HW. In profile the eye elongate and narrow, conspicuously much longer than high. Ommatidia of eye arranged as an outer ring which encloses a single longitudinal inner row of 3 ommatidia. In full-face view the eyes distinctly far in front of the midlength of the sides. Scapes, when laid straight back from their insertions, markedly failing to reach the concave occipital margin. Promesonotum shallowly convex in profile and on a higher level than the propodeum. Metanotal groove not impressed. Propodeal spiracle small but conspicuous. Petiole with a short anterior peduncle which is subtended by an elongate and distinct strip-like ventral process. Petiole node low and bluntly subconical, the ventral margin bulging and convex behind the end of the subpetiolar process. Postpetiole smaller than petiole, its node only slightly more broadly rounded than that of the petiole. Dorsum of head with sparse standing hairs which are mostly confined to the occipital margin. Dorsal alitrunk with a single pair of standing hairs, situated at the pronotal humeri. Petiole and postpetiole each with a single pair of hairs but first gastral tergite with standing hairs evenly distributed. Sculpture absent except for very short and weakly developed cross-ribs traversing the metanotal groove. Colour very pale yellow, the gaster whitish yellow; no trace of brown anywhere on the head or body.

Holotype worker, **Botswana**: Maxwee, mopane woodland, 11.ii.1976, no. 38 (*A. Russell-Smith*) (BMNH).

This minute species is rendered very distinctive by the combination of its eye form, 12-segmented antennae, and extremely reduced alitrunk pilosity. The form of the eye described above is shared with only five other Afrotropical species in which the antennae have 12 segments, but all of these (*inquietum*, *rotundatum*, *floricola*, *shilohense*, *trake*) have more than one pair of standing hairs on the alitrunk. Also, the eyes of *rotundatum* and *trake* are small (0·17–0·19 × HW) and almost circular, whilst in *floricola* and *inquietum* the head is brown in colour.

Monomorium strangulatum Santschi

Monomorium strangulatum Santschi, 1921*b*: 121, fig. 3. LECTOTYPE WORKER, TANZANIA: Bukoba, Bezirk, Buk. 26 (*Viehmeyer*) (NMB) (here designated) [examined].

Note. The two worker syntypes originally mounted on a single pin and constituting the type-series of *strangulatum* belong to two separate species. The upper specimen, which fits Santschi's original description the best, is here designated as the lectotype of *strangulatum*, and has 11 antennal segments. The lower specimen has been removed to a separate pin and now constitutes the holotype of *disoriente*; this species has 12 antennal segments.

WORKER. TL 1·8–2·0, HL 0·41–0·46, HW 0·33–0·38, CI 78–83, SL 0·32–0·38, SI 95–102, PW 0·20–0·26, AL 0·48–0·58 (10 measured).

Clypeal carinae sharply developed, widely separated and feebly divergent anteriorly, the carinae running to the anterior margin at the angle separating the anterior and lateral margins of the projecting median portion of the clypeus. Space between the clypeal carinae very shallowly transversely concave. Maximum diameter of eye 0·22–0·26 × HW and with 5 ommatidia in the longest row. In full-face view the posterior margins of the eyes at the midlength of the sides. Antennae with 11 segments and the scapes, when laid straight back from their insertions, surpassing the occipital margin. Sides of head behind eyes convex in full-face view, converging posteriorly and meeting the occipital margin through a broad continuous curve on each side, so that the transverse median portion of the occipital margin appears very short. Promesonotum domed-convex in profile, on a much higher level than the propodeum. Mesonotum forming a convex slope posteriorly to the very broadly but shallowly impressed metanotal groove, the latter with conspicuous strong cross-ribs. Propodeum behind the metanotal groove convex and sloping posteriorly, joining the declivity through a broad curve. Propodeal spiracle large, dominating the side of the sclerite. Petiole with an elongate but stout anterior peduncle which is subtended by an inconspicuous ventral process in the form of a narrow cuticular strip. Petiole node large, high and subconical, narrowly rounded above. Node of postpetiole anteroposteriorly compressed, narrow in profile, with a steeply sloping anterior face. All dorsal surfaces of head and body with numerous standing hairs, the scapes with

long suberect to subdecumbent pubescence which is almost as long as the maximum width of the scape. Head and body unsculptured except for hair-pits, metanotal cross-ribs and extensive reticulate-punctate to reticulate-granulate sculpture on the mesopleuron. Head and body dark brown, the appendages yellow and contrasting strongly with the body colour.

Despite its 11-segmented antennae the closest relatives of *strangulatum* are the 12-segmented *draxocum*, *noxitum* and *gabrielense*.

Material examined

Gabon: Plateau d'Ipassa (*J. A. Barra*). **Central African Republic**: Ubangi-Shari, Haut Mbomu (*N. A. Weber*). **Uganda**: Sese Is., Nkosi I. (*G. D. H. Carpenter*). **Tanzania**: Bukoba, Bezirk (*Viehmeyer*). **Zaire**: Ituri Forest, Beni-Irumu (*N. A. Weber*).

Monomorium symmotu sp. n.

(Fig. 79)

Holotype worker. TL 1·9, HL 0·52, HW 0·39, CI 75, SL 0·35, SI 90, PW 0·25, AL 0·56.

Clypeal carinae distinct, close together and only weakly divergent anteriorly. Space between the clypeal carinae almost transversely flat, only extremely feebly concave. Anterior clypeal margin between apices of the carinae extremely feebly concave, almost transverse. Anterior margin of prominent median portion of clypeus rounding bluntly into lateral margins, the two not separated by sharp angles or projecting denticles. Maximum diameter of eye 0·21 × HW and with 6 ommatidia in the longest row. In full-face view the posterior margins of the eyes conspicuously in front of the midlength of the sides. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head behind eyes shallowly convex and feebly convergent posteriorly, the occipital margin distinctly concave medially. Promesonotum in profile evenly convex and on a higher level than the propodeum. Posteriormost portion of mesonotum suddenly downcurved and descending steeply to the broad and deeply impressed metanotal groove. Metanotal cross-ribs strong and conspicuous; propodeal spiracle small. Propodeal dorsum in profile evenly convex, highest behind metanotal groove; the dorsum and declivity rounding broadly and evenly together so that they form a single convex curve. Node of petiole low and broad in profile, broadly rounded above; in dorsal view the node subglobular. Antero-ventral process of petiole peduncle a narrow cuticular strip. Postpetiole in profile smaller than petiole, lower and much more broadly rounded dorsally. All dorsal surfaces of head and body with standing hairs but these are relatively sparse; only 3 pairs present on the promesonotum. Sculpture absent except for scattered hair-pits and metanotal cross-ribs; the mesopleuron with some faint sculptural vestiges at about its midlength. Colour yellow.

Paratype workers. TL 1·8–1·9, HL 0·48–0·52, HW 0·36–0·39, CI 74–76, SL 0·34–0·35, SI 89–94, PW 0·23–0·25, AL 0·52–0·56 (8 measured). Maximum diameter of eye 0·20–0·23 × HW and with 5–6 ommatidia in the longest row. Otherwise as holotype.

Holotype worker, **Zimbabwe** (Rhodesia on label): Vumba Mts, nr Umtali, 11.iii.1969 (*W. L. Brown*) (MCZ).

Paratypes, 19 workers with same data as holotype (MCZ; BMNH).

Non-paratypic material examined. **Zimbabwe**: Umtali, Melsetter (*R. Mussard*).

A small member of the *rhopalocerum*-complex, *symmotu* most closely resembles *exchao*. The two are separated by their differently shaped alitrunk and petiole outlines (Figs 77, 79) and by the presence in *symmotu* of only 3 pairs of standing hairs on the promesonotal dorsum. Further notes are given under *rhopalocerum*.

Monomorium tablense Santschi stat. n.

(Fig. 80)

Monomorium altinode st. *tablensis* Santschi, 1932: 384, figs 6, 7. Syntype workers, female, South Africa: Cape Prov., Table Mt, 28.xii.1913 (*G. Arnold*) (NMB) [examined].

Worker. TL 2·1–2·2, HL 0·52–0·54, HW 0·40–0·42, CI 77–78, SL 0·39–0·40, SI 95–98, PW 0·26–0·27, AL 0·54–0·56 (2 measured).

Projecting median portion of clypeus with its anterior margin and lateral margins separated by blunt angles, without projecting prominences or denticles. Clypeal carinae weakly divergent anteriorly. Maximum diameter of eye 0·24–0·25 × HW and with 6–7 ommatidia in the longest row. With the head in full-face view the posterior margins of the eyes distinctly in front of the midlength of the sides and the antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Occipital margin of head broad and shallowly concave, the sides very weakly convex in full-face view. Promesonotum convex in profile, sloping posteriorly to the narrow and shallowly impressed metanotal groove. Propodeal spiracle small, the dorsal surface of the segment sloping posteriorly and separated from the declivity by a very obtuse bluntly rounded angle. Petiole node very narrow in profile, high and with its anterior face evenly shallowly concave, posterior face of node weakly convex. Postpetiole node smaller and rounded. Subpetiolar process a small ridge or lobe. Head and alitrunk of both extant syntypes very abraded and probably showing less hair than was originally present. Promesonotum with 2 pairs of hairs; probably more in fresh specimens. Metanotal groove with short fine cross-ribs and mesopleuron with vestiges of granulate or reticulate sculpture, but otherwise the entire body smooth and unsculptured. Colour brownish yellow to light brown.

Originally described as a stirps of *altinode*, because of the shape of the petiole node, *tablense* is really related to *rhopalocerum* and its allies, but is separated from any other species of this complex by its strangely shaped petiole (Fig. 80) and large eyes. Of the allies of *rhopalcerum*, *binatu* approaches *tablense* most closely in node shape, but in *binatu* the scapes are longer (SI 100–103) and reach the occipital margin, and the metanotal groove is much broader and more deeply impressed.

MATERIAL EXAMINED

South Africa: Table Mt (*G. Arnold*).

Monomorium taedium sp. n.

HOLOTYPE WORKER. TL 1·7, HL 0·46, HW 0·38, CI 83, SL 0·31, SI 82, PW 0·25, AL 0·49.

Clypeal carinae conspicuous, close together posteriorly and widely divergent anteriorly. Anterior margin of prominent median portion of clypeus transverse to exceptionally feebly convex, the anterior margin meeting the sides in an obtuse angle but lacking projecting sharp angles or denticles. Maximum diameter of eye 0·21 × HW, with 6 ommatidia in the longest row. With the head in profile the eye almost as high as long and the outer ring of ommatidia enclosing three longitudinal rows, unlike most other members of the *shilohense*-complex where the outer ring of ommatidia only encloses a single longitudinal row of 2–4 ommatidia. In full-face view the eyes conspicuously in front of the midlength of the sides of the head. Antennae with 11 segments. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin Promesonotum in profile feebly convex and forming a long shallow slope back to the broadly impressed metanotal groove; the latter with conspicuous cross-ribs. Propodeal dorsum highest immediately behind the metanotal groove, sloping downwards posteriorly and rounding broadly and evenly into the declivity. Propodeal spiracle small. Petiole with a short narrow anterior peduncle which has a very small anteroventral process. Ventral outline of petiole markedly concave from process to level of the spiracle, behind which it is markedly convex beneath the node proper. Petiole node in profile bluntly subconical and rounded above, the postpetiole slightly smaller but much more broadly rounded dorsally. All dorsal surfaces of head and body with standing hairs, the promesonotum with 3–4 pairs but the pronotum lacking a pair on the anterior margin between the humeral pair. Sculpture absent except for metanotal cross-ribs and some faint punctulate areas on the mesopleuron. Colour glossy medium brown.

PARATYPE WORKERS. TL 1·6–1·7, HL 0·42–0·47, HW 0·34–0·38, CI 80–83, SL 0·28–0·31, SI 80–83, PW 0·23–0·26, AL 0·44–0·49 (7 measured). As holotype but some lighter brown in colour. Maximum diameter of eye 0·19–0·22 × HW, the outer ring of ommatidia enclosing three longitudinal rows as in the holotype, or enclosing two rows plus one or two other ommatidia; with 5–6 ommatidia in the longest row.

Holotype worker, **South Africa**: Natal, Umlalazi Nat. Res., 25.iii.1979 (*D. J. Brothers*) (BMNH).
Paratypes. 7 workers with same data as holotype (BMNH; MCZ).

The type-series was recovered from a sample of leaf litter. Among the Afrotropical species with only 11 antennal segments *taedium* is isolated by its relatively large eyes, dark colour, size, and lack of an enlarged and characteristically shaped postpetiole such as is seen in *bequaerti* and its allies. Like *mictilis* and *fastidium*, *taedium* also lacks a pair of standing hairs on the anterior margin of the pronotum between the humeral pair, but *taedium* is larger than either of these and has many more ommatidia in the eye.

Monomorium tanysum sp. n.

HOLOTYPE WORKER. TL 1·5, HL 0·42, HW 0·34, CI 81, SL 0·30, SI 88, PW 0·22, AL 0·46.

Clypeal carinae sharply developed and conspicuous, widely separated and subparallel posteriorly, feebly divergent anteriorly. Space between the clypeal carinae flat to shallowly transversely concave. Anterior clypeal margin transverse between the apices of the carinae. Anterior and lateral margins of prominent median portion of clypeus separated by blunt obtuse angles, without denticles or projecting acute angles. Clypeal carinae meeting anterior margin medially of the obtuse angles separating the anterior and lateral margins, each carina paralleled externally by a weak rugule which runs back from the angle to the antennal socket. Maximum diameter of eye 0·18 × HW and with 6 ommatidia in the longest row. In full-face view the eyes just in front of the midlength of the sides. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head weakly convex in full-face view, slightly convergent both in front of and behind the eyes. Occipital margin with a short shallow median indentation. Head in profile distinctly biconvex, deepest at about the midlength. Promesonotum a low domed convexity in profile, highest at its midlength and distinctly on a much higher level than the propodeum. Metanotal groove shallowly impressed but broad, traversed by strong cross-ribs dorsally; laterally the cross-ribs are less distinct and become confused with the strong mesopleural sculpture. Propodeal spiracle small, the propodeal dorsum highest immediately behind the metanotal groove. Posterior to this the outline is almost flat in profile and sloping at about 45° until it rounds into the very short declivity through a blunt angle. In dorsal view the posterior half of the propodeum is almost flat transversely. Petiole in profile with a short anterior peduncle which is subtended by a short but deep anteroventral process. Petiole node high and subconical, narrowly rounded above. Postpetiole lower than petiole, more bluntly rounded above and with its anterior face nearly vertical, distinctly steeper than the posterior face. All dorsal surfaces of head and body with standing hairs, the promesonotum with 5 pairs. Unsculptured except for hair-pits, metanotal cross-ribs and reticulate-punctation on the mesopleuron. Colour brown, the gaster darker than the alitrunk and almost blackish brown.

PARATYPE WORKER. TL 1·6, HL 0·42, HW 0·38, CI 83, SL 0·30, SI 86, PW 0·22, AL 0·46.

As holotype but maximum diameter of eye 0·17 × HW and the anterior margin of the prominent median section of the clypeus shallowly concave.

Holotype worker, **Ghana**: Mampong, 17.xi.1969 (*P. Room*) (BMNH)
Paratype, 1 worker with same data as holotype (BMNH).

The Ghanaian *tanysum* is related most closely to the Tanzanian *disoriente*, the two sharing a very similar outline shape of alitrunk (Fig. 83). In *tanysum*, however, the ventral process of the petiole is shorter and deeper and the postpetiole node higher and narrower than is indicated in *disoriente*. Apart from this the eyes are distinctly larger in *disoriente* (0·24 × HW) and the scapes relatively longer (SI 92). *M. tanysum* and *disoriente* together are closest to *dolatu*, a form with only 11-segmented antennae. Overall appearance is very similar in all three but *dolatu* has a more strongly tapered petiole node which is very narrowly rounded above, and approaches the distinctly cuneate node form of *affabile* and *malatu*. *M. dolatu* is yellow in colour and has the eyes somewhat further forward on the side than either *tanysum* or *disoriente*. In *affabile* and *malatu* the propodeum is reticulate-punctate everywhere, a condition not present in any of the foregoing species.

Monomorium torvicte sp. n.

HOLOTYPE WORKER. TL 1·5, HL 0·45, HW 0·34, CI 76, SL 0·27, SI 79, PW 0·20, AL 0·44.

Clypeal carinae distinctly developed, relatively close together posteriorly and widely divergent anteriorly, reaching the anterior clypeal margin. Prominent median portion of clypeus with its anterior margin transverse between the apices of the carinae, the anterior and lateral borders separated by an obtuse angle but lacking denticles or projections where the borders meet. Maximum diameter of eye 0·21 × HW and with 6 ommatidia in the longest row. Eye in full-face view distinctly far in front of the midlength of the sides of the head. In profile the eye elongate-oval, its long axis noticeably greater than its vertical axis. Antennal scapes, when laid straight back from their insertions, conspicuously failing to reach the occipital margin. Sides of head shallowly convex in full-face view, broadest at about the midlength; occipital margin broad and broadly, shallowly concave. Head in profile dorsoventrally flattened. Cephalic dorsum of holotype dented but in paratypes the ventral surface of the head is flat to very shallowly convex, the dorsum only slightly more convex than the ventre in profile. Promesonotal dorsum evenly shallowly convex in profile, curving downwards posteriorly to the conspicuously impressed metanotal groove.

Metanotal cross-ribs distinct. Propodeal spiracle small and the propodeal dorsal outline convex behind the metanotal groove. Propodeum on a lower level than highest point of promesonotum and posteriorly rounding broadly and evenly into the declivity. Anterior peduncle of petiole short and stout, subtended by a short narrow strip-like anteroventral process which is truncated anteriorly. Node of petiole relatively low and broad in profile, broadly rounded above and with about the same degree of convexity as the postpetiolar dorsum. Postpetiole smaller and lower than the petiole node. All dorsal surfaces of head and body with standing hairs present. All available material somewhat abraded but the promesonotum probably with 5 pairs of standing hairs, of which the pair at the pronotal humeri is the longest. Sculpture absent except for minute hair-pits and metanotal cross-ribs. Colour uniform dark brown.

PARATYPE WORKERS. TL1·5–1·6, HL 0·44–0·45, HW 0·33–0·35, CI 75–80, SL 0·25–0·28, SI 76–80, PW 0·18–0·21, AL 0·42–0·45 (5 measured). Maximum diameter of eye 0·20–0·21 × HW. All specimens uniformly brown in colour but the shade varying from medium to dark. The lighter individuals may not have acquired full adult colour.

Holotype worker, **South Africa**: Cape Town, vii.1912, ex coll. S.A. Museum, *G. Arnold*, no. 155 (on underside of card) (*E. Phillips*) (BMNH).

Paratypes. 6 workers and 1 female mounted on same card (BMNH). Holotype is third from right and is indicated by a small directional arrow on the card.

Closest related to *mavide*, another minute South African species. Differentiating characters of *torvicte* and *mavide* are given under the latter name.

Monomorium trake sp. n.

HOLOTYPE WORKER. TL 1·6, HL 0·39, HW 0·30, CI 77, SL 0·22, SI 73, PW 0·19, AL 0·40.

Mandible equipped with three strong teeth and a minute offset basal denticle. Anterior clypeal margin more or less evenly convex between the inner borders of the mandibles, without a strongly differentiated prominent median section. Clypeal carinae feebly developed, widely divergent anteriorly. Eye in profile small, its length only slightly greater than its height and the maximum diameter of the eye 0·18 × HW. Ommatidia of eye arranged as an outer ring which surrounds a single longitudinal row, the encircled row consisting of only two ommatidia. In full-face view the eyes distinctly in front of the midlength of the sides. Antennal scapes relatively very short, SI < 75; when laid straight back from their insertions the scapes conspicuously failing to reach the occipital margin. Promesonotal dorsum evenly shallowly convex in profile, sloping posteriorly to the extremely feebly impressed metanotal groove. Propodeal spiracle small, pinhole-like. Node of petiole low and bluntly rounded dorsally, the anterior peduncle short and subtended by a strip-like ventral process which runs from close to the insertion to the strong posteroventral bulge of the petiole. Postpetiole smaller than petiole and only slightly more broadly rounded dorsally. Standing hairs present on all dorsal surfaces but everywhere sparse; the promesonotum with 5 pairs, the propodeum with a single pair. Sculpture absent except for short cross-ribs at the metanotal groove. Colour uniform yellow except for apex of first gastral tergite which is traversed by a band of brown.

PARATYPE WORKERS. TL 1·6, HL 0·38–0·39, HW 0·30, CI 77–79, SL 0·22, SI 73, PW 0·18–0·19, AL 0·38–0·40 (3 measured). As holotype but maximum diameter of eye 0·17–0·18 × HW. Only one of the paratypes shows its full complement of alitrunk pilosity, the other two both show signs of abrasion.

Holotype worker, **Ghana**: Aburi, 22.iii.1969 (*P. Room*) (BMNH)

Paratypes. 3 workers with same data as holotype (BMNH; MCZ)

One of only 6 species to combine 12-segmented antennae with the reduced form of eye described above, *trake* is isolated from the other five species sharing these characters by its very short antennal scapes, SI 73. In the remaining species (*shilohense*, *rotundatum*, *sryetum*, *floricola* and *inquietum*) SI is >75, usually >80. Other differentiating characters are noted under the names of the other five species.

Monomorium tynsorum sp. n.

(Figs 62, 87)

HOLOTYPE WORKER. TL 2·1, HL 0·54, HW 0·42, CI 78, SL 0·38, SI 90, PW 0·28, AL 0·56.

Clypeal carinae strongly developed and sharp, conspicuously divergent anteriorly and terminating on

the anterior margin in a pair of small projecting denticles. Space between the clypeal carinae transversely shallowly concave. Anterior margin of prominent median portion of clypeus transverse to extremely shallowly concave between the denticles. Maximum diameter of eye 0·24 × HW and with 7 ommatidia in the longest row. With the head in full-face view the posterior margins of the eyes in front of the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Sides of head shallowly convex behind the eyes and very feebly convergent posteriorly. Occipital margin broad and extremely weakly concave medially; almost transverse. Promesonotal dorsum evenly convex in profile, sloping posteriorly to the narrow but distinctly impressed metanotal groove. Metanotal cross-ribs short but conspicuous. Propodeal spiracle of moderate size, not reduced to a minute pinhole-like aperture. Propodeal dorsum shallowly convex and sloping posteriorly, rounding into the short but more steeply descending declivity. Petiole peduncle with a small low anteroventral process which extends back to the level of the spiracle. Petiole node high but somewhat thicker than in closely related species (compare Figs 84–88), narrowly rounded above. Postpetiole with a vertical anterior face to the node, smaller and somewhat narrower than the petiole, and more broadly rounded dorsally. All dorsal surfaces of head and body with standing hairs, the promesonotum with 7–8 pairs. Sculpture absent except for scattered minute hair-pits, metanotal cross-ribs and some faint vestiges on the mesopleuron. Colour yellow.

Paratype workers. TL 2·1–2·3, HL 0·52–0·55, HW 0·40–0·44, CI 78–81, SL 0·37–0·40, SI 90–95, PW 0·24–0·28, AL 0·54–0·60 (8 measured). As holotype but maximum diameter of eye 0·24–0·25 × HW.

Holotype worker, **Angola**: Luanda, 24.viii.1949, from body of dead bird (*G. R. Gradwell & D. Snow*) (BMNH).

Paratypes. 14 workers with same data as holotype (BMNH; MCZ).

Of the presently recognized species in the *altinode*-complex two, *occidentale* and *vonatu*, are blackish brown or black in colour and have unique clypeal and petiolar configurations respectively. The remainder, *altinode*, *angustinode*, *arnoldi*, *captator*, *fugelanum* and *tynsorum*, are yellow and lack the clypeal and petiolar specializations seen in the above. *M. angustinode* has a very distinctive form of propodeum and tubercle-borne spiracle which separates it from the remainder, and the propodeal spiracle is conspicuously enlarged in the densely hairy *captator*. The four remaining species are very closely related and details of their separation are given under *altinode*.

Monomorium vaguum Santschi

Monomorium (Lampromyrmex) vaguum Santschi, 1930*a*: 68, figs 26–29. Syntype workers, female, Zaire: Leopoldville, vi.1918 (*G. Maes*) (NMB) [examined].

Worker. TL 1·3–1·4, HL 0·37–0·40, HW 0·30–0·31, CI 76–82, SL 0·24–0·26, SI 80–86, PW 0·18–0·20, AL 0·36–0·42 (10 measured).

Clypeal carinae moderately developed but distinct, widely separated and divergent anteriorly. Median portion of clypeus shallowly prominent and unarmed, its anterior margin more or less transverse between the apices of the clypeal carinae. Maximum diameter of eye 0·20–0·23 × HW. In profile the eye conspicuously longer than high and consisting of an outer ring of ommatidia enclosing a single longitudinal row of 2–3 ommatidia. Sometimes one or two other ommatidia may also be enclosed in the ring, but this is rare. In full-face view the eyes distinctly in front of the midlength of the sides. Antennae 11-segmented. Scapes, when laid straight back from their insertions, failing to reach the occipital margins. Promesonotum in profile more or less flat posteriorly, sloping to the narrow but impressed metanotal groove. Propodeum in profile with dorsum and declivity forming a single smooth broad curve. Petiole node low and subconical, narrowly rounded above. Subpetiolar process a narrow inconspicuous strip below the short anterior peduncle. Postpetiole smaller than petiole in profile, lower and much more broadly rounded. All dorsal surfaces of head and body with standing hairs, the promesonotum characteristically with a distinct clump of 5–6 (rarely 4) pairs of standing hairs on the anterior half of the pronotum and more sparsely distributed pairs of hairs behind this. Sculpture absent except for metanotal cross-ribs and sometimes with faint shagreening on the mesopleuron. Colour ranging from dull yellow to medium brown.

I am treating all the samples mentioned below as a single species, *vaguum*, based on the combination of characters noted above and those in the key. It is fairly certain that more than one sibling species is involved here, but the few short series presently available for study do not permit any objective subdivision of the mass at this time.

Among the Afrotropical species with 11 antennal segments *vaguum* is presently characterised by its possession of a conspicuous clump of standing hairs on the anterior half of the pronotum, an area where the pilosity is obviously much denser than anywhere else on the dorsal alitrunk.

MATERIAL EXAMINED

Nigeria: Gambari (*B. Bolton*). **Zaire**: Kinshasa (Leopoldville) (*G. Maes*). **Kenya**: Galole, Hola (*V. Mahnert & J.-L. Perret*). **Botswana**: Maxwee (*A. Russell-Smith*). **South Africa**: Transvaal, Nelspruit (*M. Samways*).

Monomorium vecte sp. n.

(Fig. 68)

HOLOTYPE WORKER. TL 2·1, HL 0·51, HW 0·42, CI 82, SL 0·42, SI 100, PW 0·28, AL 0·58.

Clypeal carinae sharply developed, close together posteriorly and subparallel for most of their length, weakly divergent anteriorly. Clypeus between the carinae transversely concave and the anterior clypeal margin between the carinal apices shallowly concave. Lateral and anterior margins of prominent median portion of clypeus meeting in blunt angles, without projecting denticles or corners. Maximum diameter of eye 0·21 × HW, with 5 ommatidia in the longest row. With the head in full-face view the posterior margins of the eyes just in front of the midlength of the sides of the head. Antennal scapes, when laid straight back from their insertions, reaching or fractionally surpassing the occipital margin. Sides of head behind eyes feebly convex and somewhat convergent posteriorly in full-face view, the occipital margin exceptionally shallowly concave medially, almost transverse. Head in profile shallowly biconvex, not dorsoventrally flattened. Promesonotal dorsum in profile evenly shallowly convex, the posteriormost portion of the mesonotum suddenly downcurved and much more steeply sloping to the very broad shallowly impressed metanotal groove, the latter traversed by long, strong cross-ribs. Propodeal dorsum shallowly convex in profile and sloping posteriorly, the dorsum rounding broadly and evenly into the declivity. Propodeal spiracle large and conspicuous. Petiole node in profile relatively low and broad, bluntly subconical and with both faces very feebly convex. Subpetiolar process a narrow laminar strip. Postpetiole in profile smaller than petiole, lower and more broadly rounded. All dorsal surfaces of head and body with standing hairs present, the promesonotum with 8 or more pairs. Sides of head behind eyes and leading edges of scapes with freely projecting fine hairs. Head and body mostly unsculptured and smooth except for minute hair-pits, but the metanotum strongly cross-ribbed and the mesopleuron with transverse fine rugulose sculpture on a feebly reticulate background. A few even weaker rugulae occur on the metapleuron below the large propodeal spiracle. Head and body entirely yellow except for a darker band apically on the first gastral tergite.

PARATYPE WORKERS. TL 2·0–2·4, HL 0·48–0·60, HW 0·38–0·48, CI 78–82, SL 0·39–0·48, SI 100–105, PW 0·23–0·32, AK 0·52–0·68 (12 measured).

As holotype but maximum diameter of eye 0·21–0·23 × HW and with 5–7 ommatidia in the longest row. The mesopleural sculpture is variable. In some paratypes there is only reticulation, without trace of overlying rugulae. The paratypes show distinct size-variation but this does not affect the diagnosis of the species.

Holotype worker, **Zimbabwe**: Umtali, Melsetter, 1700 m, ii.1969 (*R. Mussard*) (MHN).
Paratypes. 12 workers with same data as holotype (MHN; BMNH; MCZ).
Non-paratypic material examined. **Rwanda**: Kayove, 2100 m, 23.iv.1973 (*P. Werner*).

The non-paratypic material consists of a short series whose size is at the lower end of the type-series' range. They agree very well with the holotype but tend to have the subpetiolar process smaller and the clypeal carinae slightly more strongly divergent anteriorly.

M. vecte is close to *firmum* within the *schultzei*-complex. Both species have relatively dense pilosity, broad shallow metanotal groove with strong cross-ribs and relatively large propodeal spiracle. The two are separated by size, *firmum* averaging larger, and by the presence of projecting pilosity on the sides of the head behind the eyes in *vecte*. Apart from these characters *vecte* has conspicuous mesopleural sculpture and a relatively small subpetiolar process. In *firmum* the mesopleuron is smooth to very faintly sculptured, and the subpetiolar process is usually distinctly larger. Compare Figs 67, 68.

Monomorium vonatu sp. n.

HOLOTYPE WORKER. TL 2·0, HL 0·49, HW 0·41, CI 84, SL 0·34, SI 83, PW 0·26, AL 0·54.

Clypeal carinae sharp and conspicuous, widely divergent anteriorly and the triangular area enclosed by the carinae and anterior margin flat transversely. Clypeal carinae reachng the anterior margin on a pair of low but distinctly projecting broad denticles. Anterior margin between the denticles transverse. Maximum diameter of eye 0·24 × HW and with 6–7 ommatidia in the longest row. In full-face view the eyes in front of the midlength of the sides, though their posterior margins are close to the midlength. Antennal scapes, when laid straight back from their insertions, failing to reach the occipital margin. Alitrunk in profile with basically the same dorsal outline shape as *fugelanum* (Fig. 88). Promesonotum evenly convex, sloping posteriorly to the narrow but conspicuously impressed metanotal groove. Metanotal cross-ribs short but strongly developed and conspicuous. Propodeal spiracle minute and pinhole-like. Propodeal dorsum sloping downwards posteriorly, the dorsum and declivity rounding evenly together, not distinctly separated, though the latter slopes more steeply than the former. Petiole in profile with a high narrow node which tapers to a point apically. The anterior and posterior faces meet in a sharp rim or edge which is continuous round the dorsum and sides of the node. Subpetiolar process an elongate but low lobe which runs to the level of the spiracle, anterior peduncle of petiole short and narrow. Postpetiole high and narrow, with a high and near-vertical anterior face; as on the petiole, the anterior and posterior faces meet in a sharp rim or edge. Standing hairs present on all dorsal surfaces of head and body, the promesonotum with 3 pairs. Sculpture absent except for minute hair-pits and metanotal cross-ribs. Colour glossy black.

Holotype worker, **Ghana**: Mampong, 10.ii.1970 (*P. Room*) (BMNH).

This glossy black West African member of the *altinode*-complex is immediately diagnosed by the structure of the petiole and postpetiole, which is shared only with the Kenyan *mirandum*. The only other West African member of this complex which is known, *occidentale*, is also darkly coloured but, apart from lacking the petiolar configuration of *vonatu*, has a pair of elongate narrow teeth on the clypeus and a very large propodeal spiracle. *M. mirandum*, the closest known relative of *vonatu*, is spectacularly coloured black and yellow and has much longer antennal scapes (SI 97–100).

The *fossulatum*-group

(Figs 93–95)

WORKER. Monomorphic, with some size variation but without allometric variation. Mandibles unsculptured except for hair-pits, armed with 4 teeth which decrease in size from apex to base and which usually have the masticatory margin markedly oblique. Palp formula 2,2 (all species). Anterior clypeal margin without a pair of projecting teeth. Median portion of clypeus narrow and sharply raised, weakly bicarinate at least posteriorly, the carinae tending to fade out anteriorly. Median portion of clypeus very narrow posteriorly, distinctly narrower than the maximum width of either frontal lobe where it passes between them; frontal lobes and antennal insertions consequently very close together (Fig. 93). Eyes minute and point-like, of only one or two ommatidia and situated at the midlength of the sides; maximum diameter of eye only 0·05–0·08 × HW. Antennae with 12 segments terminating in a large club of 3 segments. Head relatively narrow and scapes of moderate length, CI 72–85, SI 90–110. Cephalic dorsum unsculptured except for hair-pits. Lateral portions of clypeus and area immediately behind them, and area around antennal fossae, without striolate or costulate sculpture. Propodeum without transverse sculpture dorsally, with the spiracle circular to subcircular; propodeal dorsum meeting declivity in an obtuse angle or weakly denticulate at the junction. Petiole with a long anterior peduncle, the petiolar spiracle at the node or immediately in front of the anterior face of the node when viewed in profile. Fine standing hairs present on all dorsal surfaces of head and body except for the propodeum, where they are usually sparse or absent. (Workers examined: all included in this study plus the extralimital species *fossulatum* and *talpa*.)

FEMALE. Diagnosis as worker but females considerably larger than conspecific workers and with much larger eyes. Ocelli present and alitrunk with full complement of flight sclerites. HW approximately equal to the maximum width of the mesoscutum, the latter extensive and slightly longer than broad, with parapsidal grooves absent or at most extremely faint. Pronotum not forming part of dorsal alitrunk; in dorsal view only the extreme anterolateral corners of the pronotum can be seen. Axillae large, triangular in dorsal view and the distance separating them is much less than the length of either axillary sclerite. Forewing with cross-vein *m-cu* present (*cryptobium*). (Females examined: *cryptobium*, *malamixtum*, *sersalatum*, *talpa*.)

MALE. Unknown.

This small species-group, one of the most conspicuous in the genus, contains seven Afrotropical and two extralimital species. The previously described Afrotropical species were formerly referred to the genus *Syllophopsis*, now synonymized (p. 297), whilst the extralimital species have always been retained in *Monomorium*. The Afrotropical species are very widely distributed within the region. All are minute and constitute a minor fraction of the extensive leaf litter and topsoil fauna of the region. The extralimital species are widespread in the Indo-Australian region and on the islands of the Pacific and Indian Oceans (Wilson & Taylor, 1967). Much of their island spread may be the result of tramping behaviour in the relatively recent past.

These extralimital forms, *fossulatum* and *talpa*, apparently do not occur in the Afrotropical region, at least I have seen no African material referable to the two. In *fossulatum* the entire mesopleuron is sculptured, a feature not seen in Afrotropical species, and in *talpa* the promesonotum is much more strongly dome-shaped than in any species of sub-Saharan Africa.

Workers of the *fossulatum*-group resemble those of the *hanneli*-group in many of their diagnostic features, but this similarity is certainly the result of convergence as other characters such as the construction of the clypeus and petiole are markedly different, compare Figs 93, 94, 97, 98. Females of the two groups show little similarity. Those of the *fossulatum*-group have an alitrunk structure usual for *Monomorium* whilst those of the *hanneli*-group show an alitrunk structure which is derived from this plan. The real origins of the *fossulatum*-group appear to lie within the *monomorium*-group, being derived from them in the worker caste by reduction of the eyes, approximation of the antennal insertions (thus reducing the width of the clypeus between the frontal lobes and narrowing the raised median portion of the clypeus), enlargement of the antennal club, and lengthening of the petiolar anterior peduncle. An apparently undescribed species from Madagascar (in BMNH) shows some character states intermediate between the *monomorium*-group and the *fossulatum*-group. Its eyes are small (about 7 ommatidia), the antennal insertions are not so closely approximated as in the *fossulatum*-group, and the petiolar peduncle, though longer than is usual in the *monomorium*-group, is not as long as that seen in *fossulatum* and its allies.

Monomorium cryptobium (Santschi) **comb. n.**

Syllophopsis cryptobia Santschi, 1921*b*: 119, figs 2a–c. Holotype worker, ZAIRE (*Le Moult*) (NMB) [examined].

WORKER. TL 1·3–1·7, HL 0·36–0·43, HW 0·28–0·34, CI 78–83, SL 0·27–0·34, SI 93–100, PW 0·20–0·26, AL 0·40–0·50 (15 measured).

Minute species with eyes of a single ommatidium, the maximum diameter of the eye 0·06 × HW or less. Promesonotum in profile with its dorsal outline evenly convex but rather shallowly so, not strongly dome-shaped. Metanotal groove narrow in profile but sharply impressed, the propodeal dorsum behind the groove sloping posteriorly. Highest point of propodeum immediately behind the metanotal groove, without a sharp central peak or narrow transverse crest. Junction of propodeal dorsum and declivity equipped with a pair of minute tubercles or tiny denticles. All dorsal surfaces of head and body with numerous short erect to suberect hairs and erect to suberect pubescence. Hairs on the propodeum sparser than elsewhere on the alitrunk, reduced to one or two pairs. In full-face view the antennal scapes and sides of the head behind the eyes with erect to subdecumbent pubescence; pubescence not appressed everywhere. Head and body smooth and shining everywhere except for scattered minute hair-pits. Sides of alitrunk smooth except for the impressed groove where mesopleuron meets metapleuron, and the area of the bulla of the metapleural gland. Colour usually dull yellow to light brownish yellow but a few samples darker, medium brown.

Widely distributed in the leaf litter and topsoil layer of the west and central African forests, this minute species is the commonest member of the group. As noted above the colour of *cryptobium* is usually dull yellow to light brownish yellow, but a few individuals from Cameroun are considerably darker. At present I cannot assess the significance of this and so retain the darker colour samples in *cryptobium*.

The closest relative of *cryptobium* is *malamixtum*; for discussion see under the latter name.

MATERIAL EXAMINED

Ivory Coast: Dropleu (*Mahnert & Perret*); Issoneu (*Mahnert & Perret*); Man (*Mahnert & Perret*). **Ghana**: Mampong (*P. Room*); Mampong (*D. Leston*); Tafo (*B. Bolton*); Axim (*C. A. Collingwood*). **Nigeria**:

Ibadan (*A. Russel-Smith*). **Cameroun**: Nkoemvon (*D. Jackson*). **Gabon**: Ile aux Singes (*J. A. Barra*). **Zaire**: no loc. (*Le Moult*).

Monomorium elgonense (Santschi) **comb. n.**

Syllophopsis elgonensis Santschi, 1935*b*: 267, fig. 4. Holotype worker, KENYA: Mt Elgon, camp 1, st. 13, 2100 m, 1932–33 (*Jeannel & Chappuis*) (MNHN) [examined].

WORKER. TL 1·9–2·0, HL 0·48–0·51, HW 0·40–0·43, CI 80–84, SL 0·36–0·39, SI 90–95, PW 0·29–0·30, AL 0·56–0·60 (8 measured).

Eyes of a single ommatidium, maximum diameter 0·05–0·07 × HW. Antennal scapes relatively short, SI < 100. Promesonotal dorsal outline evenly rounded in profile, the metanotal groove conspicuously impressed. In profile the propodeal dorsum immediately behind the groove with a small peak, which appears as a weak transverse crest in dorsal view. Propodeal dorsum behind this peak sloping posteriorly to the pair of short broad denticles or prominent triangular angles which mark the junction of dorsum and declivity. All dorsal surfaces of head and body with numerous short hairs and very sparse pubescence. Propodeum with only 1–2 pairs of hairs. Pubescence on sides of head behind eyes decumbent to appressed, that on the antennal scapes more elevated but not erect. Unsculptured everywhere except for scattered minute hair-pits, and some faint striation on the bullae of the metapleural glands; lower halves of mesopleuron smooth and shining. Colour uniform yellow.

The holotype is much abraded and densely coated with old glue which obscures the pilosity and some of the surface detail. Despite this it matches the other Kenyan series noted below, which I am certain is conspecific with the holotype.

M. elgonense is separated from *jonesi* and *thrascoleptum* by its shorter scapes, from the Rwandan *sersalatum* and the west African *malamixtum* by its smooth mesopleuron, from *modestum* by its deeply impressed metanotal groove, and from *cryptobium* by being larger and having the propodeum produced into an acute peak behind the metanotal groove. At present *elgonense* is known only from Kenya.

MATERIAL EXAMINED

Kenya: Mt Elgon (*Jeannel & Chappuis*); Embu, Kirimiri Forest west of Runyenje (*Mahnert & Perret*).

Monomorium jonesi Arnold

Syllopsis [sic] *arnoldi* Santschi, 1921*b*: 120, figs 2d,e. Syntype workers, SOUTH AFRICA: Natal, Mfongosi (*Jones*) (NMB) [examined]. [Junior secondary homonym of *Monomorium arnoldi* Forel, 1913*b*: 137.]
Monomorium (Syllophopsis) jonesi Arnold, 1952: 465. [Replacement name.]

Note. The published original description of this species was under the name *arnoldi*, as noted above, but the determination label on the syntypes gives *arnodiella* [sic]. Arnold (1952: 465–466) criticized the genus-level status of *Syllophopsis* which it held at that time, and reduced it to a subgenus of *Monomorium*, erecting *jonesi* as a replacement name for the secondary homonym with *arnoldi* thus produced. Ettershank (1966) maintained *Syllophopsis* as a valid genus, without, however, having seen any material referable to the group, and thus treated *jonesi* as an unnecessary replacement name. With the present confirmation of *Syllophopsis* as a junior synonym of *Monomorium* the rules of homonymy again come into effect, and *jonesi* is reinstated as the valid name for this species.

WORKER. TL 2·2–2·3, HL 0·54–0·55, HW 0·40–0·41, CI 72–75, SL 0·43–0·44, SI 107–110, PW 0·29–0·30, AL 0·60–0·64 (2 measured).

Eyes of a single ommatidium, maximum diameter 0·05 × HW. Head relatively narrow (CI 75 or less) and antennal scapes relatively long, with SL always greater than HW (SI > 100). Promesonotal outline in profile evenly domed-convex, the metanotal groove sharply but narrowly impressed. Propodeal dorsal outline rising from the metanotal groove, then curving into the dorsum proper and sloping to the minute triangular denticles at the junction of dorsum and declivity; without a raised peak or transverse ridge at the highest point immediately behind the metanotal groove. All dorsal surfaces of the head and body with numerous short standing hairs. These hairs not as numerous as elsewhere in the group but I suspect that the syntypes are somewhat abraded. Scapes, tibiae and sides of head behind eyes, when seen in full-face view, with sparse appressed pubescence, none of which is erect or suberect. Head unsculptured except for minute scattered hair-pits. Alitrunk unsculptured except for the oblique impressed area between the

mesopleuron and metapleuron/propodeum where some faint ribbing is present; and on the metapleuron which has some feeble longitudinal rugulae. Propodeum unsculptured above. Colour uniform yellow.

This quite distinctive member of the group is known only from the two syntypes which constitute the type-series. *M. jonesi* appears to be closest related to *thrascoleptum* from Ivory Coast, but *jonesi* lacks the dense erect to suberect pubescence which is so obvious in *thrascoleptum*.

MATERIAL EXAMINED

South Africa: Natal, Mfongosi (*Jones*).

Monomorium malamixtum sp. n.

HOLOTYPE WORKER. TL 2·0, HL 0·44, HW 0·36, CI 82, SL 0·36, SI 100, PW 0·27, AL 0·54.

Minute species with eyes of a single ommatidium, the maximum diameter 0·06 × HW. With head in full-face view the sides and the occipital margin very shallowly convex. Antennal scapes of moderate length, SI 100 (range of SI 91–100 in all samples). With alitrunk in profile the promesonotal dorsum evenly arched-convex, the metanotal groove deeply and conspicuously impressed. Propodeal dorsum immediately behind metanotal groove rising to a narrow acute peak, behind which the surface slopes posteriorly to the minute propodeal denticles. In dorsal view the propodeal peak is seen as a narrow inconspicuous transverse crest immediately behind the metanotal groove. Dorsal surfaces of head and body with fine hairs and pubescence, sparsest on the propodeum where only a couple of pairs of hairs occur. With the head in full-face view the scapes and sides behind the eyes with subdecumbent to decumbent pubescence, no pubescence conspicuously erect. All dorsal surfaces of head and body unsculptured except for scattered minute hair-pits but the sides of the alitrunk with the lower two-thirds of the mesopleuron finely punctulate-shagreenate, the impression between mesopleuron and propodeum very finely cross-ribbed and the metapleural gland bullae finely striolate. Colour brown.

PARATYPE WORKERS. TL 1·6–2·0, HL 0·40–0·44, HW 0·32–0·37, CI 80–85, SL 0·32–0·36, SI 91–100, PW 0·24–0·27, AL 0·44–0·54 (10 measured). As holotype but maximum diameter of eye 0·06–0·08 × HW. Mesopleural sculpture covers the lower one-half to two-thirds of the sclerite.

Holotype worker, **Ivory Coast**: Man, Mt Tonkoui, 900 m, 13.x.1980 (*Mahnert & Perret*) (MHN).

Paratypes. 15 workers and 2 females with same data as holotype; 12 workers, Tai Forest, 17.x.1980 (*Mahnert & Perret*) (MHN; BMNH; MCZ).

Non-paratypic material examined. **Ivory Coast**: Agboville, Yapo Forest, Yapo-Gare (*I. Löbl*); Abidjan, Banco Nat. Pk. (*I. Löbl*); Dropleu (*Mahnert & Perret*). **Togo**: Palime, Klouto Forest (*Vit*).

The non-paratypic material matches the type-series except that the Togo specimens are lighter in colour than those from Ivory Coast, being yellowish brown. The workers in this short series may be tenerals.

M. malamixtum resembles the widespread *cryptobium* but the two are usually separable on colour alone, the former being brown and the latter yellow. However, the presence of relatively dark individuals of *cryptobium* in Cameroun and possibly of light individuals in Togo means that colour alone is not always diagnostic. Separation of such dubious samples (as well as of more normally coloured material) rests on the fact that in *cryptobium* the mesopleuron is smooth and the propodeum does not have an acute peak behind the metanotal groove, whilst in *malamixtum* at least the lower half of the mesopleuron is sculptured and the metanotal groove is followed by an acute peak on the propodeum which appears as a narrow transverse crest in dorsal view.

Monomorium modestum Santschi

(Fig. 95)

Monomorium modestum Santschi, 1914*b*: 17. Syntype workers, SOUTH AFRICA: Natal, Stamford Hill, i.1905 (*I. Trägårdh*) (NMB) [examined].

Monomorium (Syllophopsis) modestum Santschi; Santschi, 1915: 260.

Monomorium (Syllophopsis) modestum var. *boerorum* Santschi, 1915: 260, fig. 9. Syntype workers, SOUTH AFRICA: Pretoria (NMB) [examined]. [Junior primary homonym of *Monomorium minutum* var. *boerorum* Forel, 1910*a*: 442.] **Syn. n.**

Monomorium (Syllophopsis) modestum var. *transwaalensis* Emery, 1922: 175. [First replacement name for *boerorum* Santschi.] **Syn. n.**

Monomorium (Syllophopsis) modestum var. *smutsi* Wheeler, 1922: 867. [Second replacement name for *boerorum* Santschi.] **Syn. n.**

Worker. TL 1·7–2·0, HL 0·39–0·48, HW 0·32–0·36, CI 74–82, SL 0·29–0·34, SI 94–100, PW 0·22–0·26, AL 0·44–0·52 (15 measured).

Within the limits given for the *fossulatum*-group (see above) *modestum* is presently diagnosed by its yellow colour, rounded to angular propodeum which lacks denticles at the junction of dorsum and declivity seen in all other species of the group, and by its lack in profile of a sharply impressed U- or V-shaped metanotal groove, *modestum* having instead a simple indentation of the surface which is scarcely or not impressed (Fig. 95).

This overall diagnosis applies to the three widely separated populations cited in the material examined. Very little material of each is available for study and I suspect strongly that these populations may represent more than one species. However, until more collections of forms fitting the above definition have been acquired, no meaningful statements regarding their species-level taxonomy can be made.

Material examined

Ivory Coast: Man (*Mahnert & Perret*); Adiopodoume For. Biol. Res. (*I. Löbl*). **Kenya**: Tana Riv., Galole (Hola) (*Mahnert & Perret*). **South Africa**: Natal, Stamford Hill (*I. Trägårdh*); St Lucia Estuary (*D. J. Brothers*); Pretoria; Cape Prov., Grahamstown (*W. L. Brown*).

Monomorium sersalatum sp. n.

Holotype worker. TL 2·2, HL 0·52, HW 0·42, CI 81, SL 0·42, SI 100, PW 0·31, AL 0·62.

Eyes of a single ommatidium, maximum diameter 0·07 × HW. Antennal scapes of moderate length, SI 100 in holotype (SI 94–100 in paratypes). Promesonotum in profile with dorsal outline evenly convex, the metanotal groove a sharply defined V-shaped impression. Propodeum immediately behind the metanotal groove rising to an acute peak then sloping quite steeply posteriorly to a pair of weakly projecting denticuliform angles which separate dorsum from declivity. All dorsal surfaces of head and body with numerous short standing hairs except for the propodeum where only two pairs are present. With the head in full-face view the scapes and sides of the head behind the eyes with erect to suberect pubescence. Femora and tibiae with conspicuously elevated pubescence. Dorsal surfaces of head, alitrunk and gaster unsculptured except for scattered minute hair-pits. Sides of pronotum smooth. Lower half of mesopleuron finely but conspicuously punctulate-shagreenate, the upper half of the mesopleuron retaining vestiges of similar sculpture. Impression between mesopleuron and metapleuron/propodeum finely cross-ribbed. Sides of propodeum unsculptured but metapleuron finely longitudinally striate. Colour uniform yellow.

Paratype workers. TL 2·0–2·2, HL 0·47–0·52, HW 0·38–0·44, CI 80–85, SL 0·36–0·42, SI 94–100, PW 0·26–0·31, AL 0·50–0·62 (13 measured). As holotype.

Holotype worker, **Rwanda**: Kamiranzovu, 1900 m, i.1976 (*P. Werner*) (MHN).

Paratypes. 5 workers with same data as holotype; 6 workers, Kayove, 2100 m, 25.v.1973 (*P. Werner*); 3 workers and 1 female, Rangiro, 1800 m, 10.vii.1973 (*P. Werner*); 10 workers, Rangiro, ix.1976 (*P. Werner*) (MHN; BMNH; MCZ).

Known only from Rwanda, this montane species possesses a distinctly sculptured lower mesopleuron, a feature encountered in the African species of this group only here and in the west African *malamixtum*. The latter species, however, averages smaller than *sersalatum* and is much darker in colour.

Monomorium thrascoleptum sp. n.

(Figs 93, 94)

Holotype worker. TL 2·1, HL 0·49, HW 0·40, CI 81, SL 0·41, SI 103, PW 0·30, AL 0·58.

Eyes of a single ommatidium, maximum diameter 0·07 × HW. Antennal scapes relatively long (SI > 100). Promesonotum in profile evenly rounded, the metanotal groove deeply and conspicuously impressed. Propodeal dorsum immediately behind the metanotal groove raised and angular in profile, but not surmounted by an acute peak which appears as a transverse crest in dorsal view. Behind this highest point the propodeal dorsum sloping shallowly to the angular to slightly prominent corners which separate dorsum and declivity. All dorsal surfaces of head and body with fine standing hairs, sparsest on the

propodeum and densest on the head and gaster. With the head in full-face view the sides behind the eyes and the antennal scapes with conspicuously elevated pubescence which is suberect to subdecumbent. Entire body smooth and shining, unsculptured except for hair-pits, cross-ribbing at the mesopleural-propodeal junction and a few faint striae over the bulla of the metapleural glands. Colour uniform clear yellow.

PARATYPE WORKERS. TL 1·9–2·2, HL 0·46–0·50, HW 0·38–0·41, CI 80–83, SL 0·40–0·44, SI 103–110, PW 0·28–0·31, AL 0·56–0·60 (8 measured). As holotype but some with the angulate corners of the propodeum more strongly prominent.

Holotype worker, **Ivory Coast**: Nzi Noua, 13.i.1977 (*W. L. Brown*) (MCZ).
Paratypes. 8 workers with same data as holotype (MCZ; BMNH).

M. thrascoleptum is the largest member of this group found in West Africa, and the only West African species with SI consistently greater than 100. Apart from this *thrascoleptum* differs from *modestum* by having the metanotal groove deeply impressed, and from *malamixtum* by being yellow and lacking mesopleural sculpture.

The *hanneli*-group

(Figs 96–98)

WORKER. Monomorphic. Mandibles unsculptured, with 4 teeth which decrease in size from apex to base. Palp formula 2,2 (*jacksoni*, *hanneli*, *invidium*). Median portion of clypeus with a pair of sharply defined posteriorly convergent raised carinae, which terminate at the anterior margin in a pair of short teeth. Frontal lobes close together, the median strip of clypeus which runs between them narrow, narrower to only fractionally wider than either of the frontal lobes. Eyes small, the maximum diameter 0·13–0·18 × HW; the eyes always with more than 5 ommatidia in total but less than 25, situated in front of the midlength of the sides of the head. Antennae with 12 segments, terminating in a large 3-segmented club. Head moderately broad and scapes relatively short, CI 81–90, SI 75–86. Propodeum usually very finely transversely sculptured, sometimes smooth, bluntly angular to bluntly bidentate where the dorsum meets the declivity. Petiolar peduncle short in profile, the node high and the spiracle behind the level of the anterior face of the node. Cephalic dorsum unsculptured except for hair-pits; lateral portions of clypeus, area immediately behind lateral portions of clypeus and area around antennal fossae without striolate or fine costulate sculpture. Fine standing hairs present on all dorsal surfaces of head and body. (Workers examined: all species of the group.)

FEMALE. Only very slightly larger than the conspecific worker. As worker but with proportionately much larger eyes, ocelli present, and alitrunk with a full complement of flight sclerites. HW distinctly greater than the maximum width of the mesoscutum, the latter as broad as long or slightly broader than long. In dorsal view the pronotum forming a part of the dorsal alitrunk, appearing as a broad transverse collar in front of the mesoscutum and being much wider laterally than mesally. Parapsidal grooves conspicuous to vestigial. Axillae in dorsal view wedge-like and with a gap between their inner apices; the length of the gap about equal to the length of one of the axillary sclerites. Propodeum bluntly angular to low bidentate at junction of dorsum and declivity. (Females examined: *jacksoni*, *invidium*.)

MALE. Unknown.

The five species of this distinctive and purely Afrotropical group are all very closely related and have no obviously related forms outside the region. With their narrow median clypeus, closely approximated frontal lobes and small eyes they appear at first glance to be close to the *fossulatum*-group, but in workers of that group the petiolar peduncle is long and the node low, the eyes are usually only of a single ommatidium and the clypeus lacks teeth anteromedially. In the females the pronotum does not form part of the dorsal alitrunk in the *fossulatum*-group and the axillae of the latter are much closer together. It thus appears that the characters apparently shared by the workers are the result of convergence rather than indicators of genuine relationship.

All species of the *hanneli*-group form part of the leaf litter and topsoil fauna, nesting in rotten twigs in the litter layer or in tree stumps. Of the three West African species one, *invidium*, is very widespread and ranges from Ivory Coast to Cameroun in the forest zone. The other two, *guineense* and *jacksoni*, are only known from the forests of Guinea and Cameroun respectively. The females of *invidium* and *jacksoni*

mentioned above were the reproductives of established colonies; alate females remain unknown, as do all males of this group. The two Kenyan species, *hanneli* and *valtinum*, are only known from the workers and from relatively few series.

Monomorium guineense (Bernard)

(Fig. 96)

Epixenus guineensis Bernard, 1952: 238, figs 10F–I. Syntype workers, GUINEA: Mont Tô, ravin 1, st. B2.41, forêt, 21.2 (*Lamotte*) (MNHN) [examined].
Monomorium guineense (Bernard) Brown & Wilson, 1957: 245.

WORKER. TL 2·3, HL 0·56, HW 0·48, CI 86, SL 0·38–0·39, SI 79–81, PW 0·35–0·36, AL 0·62 (2 measured).

As the more common and more widely distributed *invidium* but with smaller eyes, the maximum diameter 0·13 × HW and with 4 ommatidia in the longest row. The head and alitrunk are unsculptured everywhere except for faint hair-pits, and the propodeal dorsum lacks the faint transverse rugulae usually seen in *invidium*. In profile the propodeal dorsum meets the declivity in a pair of prominent but obtuse angles and the body colour is uniform dark brown. The nodes of the petiole and postpetiole are much more strongly antero-posteriorly compressed and scale-like than in any other member of the group (Fig. 96), the nodes in profile being high narrow and very narrowly rounded dorsally. The postpetiole is slightly narrower than the petiole in profile. In dorsal view both nodes are broad, the dorsal surfaces very short from front to back and the postpetiole only fractionally thicker than the petiole.

Known only from the few syntype workers constituting the type-series *guineense* is separated from *invidium* by the characters noted above. The third West African species of this group, *jacksoni*, is quickly separated from *guineense* as the former has the propodeum very strongly sculptured, as well as having petiole and postpetiole nodes which are broader than in *guineense*.

Because of its relatively broad and narrow nodes *guineense* was first described in *Epixenus*, a spurious generic name which covered a loose assemblage of *salomonis*-group species linked by their development of apterous or ergatoid females and a tendency in some of their females to possess relatively broad narrow nodes. This was obviously the criterion uppermost in Bernard's mind when he assigned *guineense* to *Epixenus*, but it is now plain that *guineense* is not closely related to any *salomonis*-group species and the name *Epixenus* itself is a straight synonym of *Monomorium*.

Monomorium hanneli Forel

Monomorium hanneli Forel, 1907*a*: 18. Holotype worker, KENYA: Mto-ya-Kifaru (*Katona*) (MNH) [examined].
Monomorium moestum Santschi, 1914*a*: 74, fig. 7. Holotype worker, KENYA: Naivasha, 1900 m, st. no. 14, i.xii.1911 (*Alluaud & Jeannel*) (NMB) [examined]. **Syn. n.**

WORKER. TL 2·4–2·8, HL 0·54–0·64, HW 0·45–0·56, CI 83–90, SL 0·34–0·44, SI 75–81, PW 0·30–0·40, AL 0·60–0·76 (18 measured).

Mandibles smooth and shining, with scattered hair-pits. Clypeal carinae very sharply defined and terminating in a pair of short but acute triangular teeth. Eyes small, maximum diameter 0·16–0·19 × HW and with 4–6 ommatidia in the longest row. Eyes with 11–21 ommatidia in all, arranged in a peripheral ring which encloses 2–7 ommatidia. Promesonotum evenly but shallowly convex in profile, the metanotal groove impressed and the propodeal dorsum behind the groove sloping posteriorly. Dorsal surface of propodeum meeting the declivity in a blunt obtuse angle. Lateral margins of propodeal dorsum with low blunt marginations, very low and rounded in larger workers. Dorsal sculpture of propodeum terminates at the marginations and helps to define their positions. Dorsum between propodeal marginations transversely flat anteriorly, extremely shallowly concave posteriorly. Petiole node in profile high and narrow, the height of the node from spiracle to apex distinctly greater than the distance from the spiracle to the insertion of the peduncle. In dorsal view both nodes transverse, distinctly very much broader than long. Cephalic dorsum unsculptured except for small hair-pits and a few short rugulae behind the frontal lobes. Promesonotum glassy smooth dorsally but propodeal dorsum with superficial fine transverse costulae which are faint or almost effaced medially in some individuals. Sides of alitrunk smooth except for some fine longitudinal rugulae on the metapleuron. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with conspicuous standing hairs. Colour glossy brown, the appendages lighter.

This is a larger and more size-variable relative of *valtinum*, the only other East African species in this group. The eyes of *hanneli* are larger than those of *valtinum*, both relatively and absolutely.

MATERIAL EXAMINED

Kenya: Mto-ya- Kifaru (*Katona*); Narok, Loita Hills, Morijo (*Mahnert & Perret*); Taita Hills, nr Wundanyi (*V. Mahnert*); Naivasha (*Alluaud & Jeannel*).

Monomorium invidium sp. n.

(Figs 97, 98)

HOLOTYPE WORKER. TL 1·9, HL 0·48, HW 0·41, CI 85, SL 0·34, SI 83, PW 0·31, AL 0·54.

Mandibles smooth and shining, unsculptured except for scattered hair-pits. Pair of teeth on anterior clypeal margin conspicuous. Maximum diameter of eye 0·15 × HW, with 4 ommatidia in the longest row; the outer peripheral ring of ommatidia enclosing only two ommatidia within the ring. Promesonotum shallowly convex in profile, the metanotal groove narrow and shallowly impressed. Propodeal dorsum sloping downwards posteriorly and rounding narrowly into the declivity, the dorsal surface of the propodeum bluntly marginate laterally and the dorsum between the blunt margins very shallowly concave. Petiole and postpetiole in profile high and narrow, the nodes narrowly but bluntly rounded above and the latter node slightly thicker than the former. In dorsal view the nodes broadly transversely elliptical. Cephalic dorsum behind the frontal lobes smooth, unsculptured except for hair-pits. Sides of head without a narrow sculptured strip running from the anterior margin of the eye to the base of the mandible, and the occipital margin unsculptured. Promesonotum smooth and highly polished both dorsally and laterally. Remainder of sides of alitrunk with sculpture only on lower half and round the margin of the mesopleuron, on the metapleuron, and with a small sculptured patch on the propodeum behind the level of the spiracle. Propodeum in dorsal view finely and faintly transversely rugulose. Petiole postpetiole and gaster unsculptured in dorsal view. All dorsal surfaces of head and body with numerous standing hairs. Colour highly polished blackish brown.

PARATYPE WORKERS. TL 1·8–2·0, HL 0·48–0·50, HW 0·40–0·42, CI 82–85, SL 0·33–0·36, SI 81–86, PW 0·30–0·31, AL 0·54–0·56 (10 measured). As holotype but eyes may have 3–4 ommatidia in the longest row and have maximum diameter 0·15–0·17 × HW. Sculpture on propodeal dorsum is sometimes effaced medially, being visible only close to and on the lateral marginations. On the sides of the alitrunk the mesopleuron may be smooth with only peripheral sculpture developed, and the sculptured patch behind the propodeal spiracle is sometimes absent. Colour varies from blackish brown to jet black.

Holotype worker, **Nigeria**: Ibadan, IITA, sample 06, 28.iv.1981 (*A. Russell-Smith*) (BMNH).

Paratypes. 10 workers and one dealate female with same data as holotype (BMNH; MHN; MCZ).

Non-paratypic material examined. **Guinea**: Mt Nimba (*Villiers*). **Ivory Coast**: Sassandra (*I. Löbl*); Abidjan, Banco Nat. Pk. (*I. Löbl*); Man (*I. Löbl*); Bingerville (*Mahnert & Perret*); Nzi Noua (*W. L. Brown*); Issoneu (*Mahnert & Perret*); Abidjan (*T. Diomande*). **Ghana**: Mampong (*P. Room*). **Nigeria**: Ile-Ife (*J. T. Medler*); Gambari (*B. Bolton*); Gambari (*B. Taylor*). **Cameroun**: Nkoemvon (*D. Jackson*).

The non-paratypic material shows the following range of dimensions. TL 1·8–2·3, HL 0·46–0·56, HW 0·39–0·48, CI 82–86, SL 0·32–0·38, SI 79–84, PW 0·30–0·34, AL 0·50–0·62 (15 measured). In these series eye size shows the range 0·14–0·17 × HW and the eyes have 3–5 ommatidia in the longest row. In larger workers the peripheral ring of ommatidia may surround 5 others, rather than the 2–3 which seems more usual. In some individuals the sculpture of the propodeal dorsum is almost or entirely effaced, leaving the surface glassy smooth. Similarly the sides of the alitrunk may lack sculpture except in the vicinity of the metapleural gland bulla. Outline shape of the propodeum in profile varies from narrowly but bluntly rounded to sharply obtusely angular.

M. invidium is the commonest and most widely distributed member of this small group in West Africa. It separates easily from the other two known West African species as *jacksoni*, known only from Cameroun, is much more strongly sculptured, and *guineense* from Guinea has much narrower scale-like nodes.

Monomorium jacksoni sp. n.

HOLOTYPE WORKER. TL 2·0, HL 0·46, HW 0·39, CI 85, SL 0·32, SI 82, PW 0·29, AL 0·55.

Mandibles unsculptured except for hair-pits. Median portion of clypeus flanked by a pair of short triangular denticles which are not strongly prominent, but the edges of the median clypeal bicarination

V-shaped and very sharply defined. Eyes small, maximum diameter 0·15 × HW and with only 3 ommatidia in the longest row. Eye consisting of only 6 ommatidia in total, without central ommatidia surrounded by a peripheral ring. Promesonotum shallowly convex, the metanotal groove weakly impressed. Propodeal dorsum behind the metanotal groove sloping posteriorly; dorsum and declivity separated by a blunt angle. Dorsum of propodeum marginate laterally, the marginations diverging posteriorly. Petiole and postpetiole shaped as in *invidium* (Fig. 98). Cephalic dorsum smooth, unsculptured except for hair-pits and some short faint costulae behind the frontal lobes. Sides of head mostly unsculptured but the strip of cuticle between the eye and the mandibular insertion sculptured, this sculptured strip being slightly wider than the eye itself. Promesonotum glassy smooth everywhere, mesopleuron sculptured except for a smooth patch posterodorsally. Metapleuron completely sculptured as is the propodeal side except for a smooth area around the spiracle. Propodeal dorsum conspicuously transversely rugulose, the spaces between the rugulae punctate. Petiole, postpetiole and gaster unsculptured in dorsal view. All dorsal surfaces of head and body with numerous standing hairs. Colour of head and body blackish brown.

Paratype workers. TL 1·8–2·0, HL 0·44–0·47, HW 0·38–0·40, CI 85–89, SL 0·30–0·34, SI 79–85, PW 0·27–0·30, AL 0·52–0·56 (12 measured). As holotype but eyes with maximum diameter 0·14–0·15 × HW and with 6–7 ommatidia in total. In some almost the upper third of the mesopleuron is unsculptured.

Holotype worker, **Cameroun**: Nkoemvon, 12.i.1980 (*D. Jackson*) (BMNH).
Paratypes. 7 workers and 1 female with same data as holotype; 5 workers with same data but 5.i.1980 (BMNH; MHN; MCZ).

Very closely related to *invidium*, which also occurs at the type-locality of *jacksoni*, but the latter with much stronger sculpture on the propodeal dorsum and sides of the alitrunk, and with smaller and less prominent clypeal teeth.

Monomorium valtinum sp. n.

Holotype worker. TL 1·9, HL 0·48, HW 0·40, CI 83, SL 0·32, SI 80, PW 0·28, AL 0·52.
Mandibles unsculptured except for small hair-pits. Clypeal carinae sharply defined, raised and terminating in two short triangular teeth at the anterior clypeal margin. Eye small, maximum diameter 0·15 × HW and with 3 ommatidia in the longest row. Entire eye with only 6 ommatidia, these not arranged in a peripheral ring which encloses centrally placed ommatidia. Promesonotum evenly but shallowly convex in profile, the metanotal groove feebly impressed and the propodeum sloping posteriorly behind the groove. Propodeal dorsum and declivity separated by an obtuse and bluntly rounded angle in profile. Propodeum in dorsal view with its lateral borders bluntly marginate, the surface between the marginations flat to shallowly transversely concave. Nodes of both petiole and postpetiole high and narrow in profile, in the former the distance from the spiracle to the apex of the node considerably greater than the distance from the spiracle to the insertion of the peduncle. In dorsal view both nodes transverse, conspicuously much broader than long. Cephalic dorsum unsculptured except for hair-pits and some faint sculpture immediately behind the frontal lobes. Promesonotum dorsally glassy smooth but the propodeal dorsum very finely and faintly transversely striolate. Sides of alitrunk unsculptured except for the metanotum and some vestigial traces at about the mid-height of the mesopleuron. Petiole, postpetiole and gaster unsculptured. All dorsal surfaces of head and body with standing hairs present. Colour glossy light brown, yellowish brown in places; the appendages light brownish yellow.

Paratype workers. TL 1·8–1·9, HL 0·47–0·48, HW 0·39–0·40, CI 81–83, SL 0·32–0·33, SI 80–83, PW 0·28–0·29, AL 0·51–0·53 (8 measured). As holotype but maximum diameter of eye 0·13–0·15 × HW, with a total of 6–7 ommatidia and with 3–4 in the longest row.

Holotype worker, **Kenya**: Kilifi Dist., Jilore, 29.x.1977 (*Mahnert & Perret*) (MHN).
Paratypes. 5 workers with same data as holotype (MHN; BMNH; MCZ).

This small light brown species differs from *hanneli*, the only other member of this group from eastern Africa, by being smaller, showing less size variation, and having relatively very small eyes both in terms of size and of number of ommatidia present.

The *latinode*-group

(Figs 99, 100)

WORKER. Size variable in any given series, showing simple monophasic allometric variation. Palp formula 3,3 (*latinode*). Mandibles unsculptured, with 5 teeth which decrease in size from apex to base. Median portion of clypeus broad and weakly bicarinate; posteriorly distinctly broader than the maximum width of either frontal lobe where it passes between them. Anterior clypeal margin without a pair of projecting teeth. Cephalic dorsum unsculptured except for hair-pits. Lateral portions of clypeus, area immediately behind clypeus, and area around antennal fossae mostly or entirely smooth, sometimes with vestiges of striolate or costulate sculpture. Eyes of moderate size, with 7–9 ommatidia in the longest row, their maximum diameter 0·19–0·21 × HW. Eyes situated conspicuously in front of the midlength of the sides in full-face view. In profile the long axis of the eye not strongly oblique with respect to the long axis of the head, the eyes not reniform. Antennae with 12 segments, with a strongly developed club of 3 segments. Propodeal spiracle circular. Propodeal dorsum transversely sculptured and rounding into the declivity. Track of metanotal groove in dorsal view not transverse but anteriorly arched or even inverted V-shaped medially. Petiolar spiracle close to level of anterior face of node. Fine standing hairs present on all dorsal surfaces of head and body.

FEMALE. As worker but larger, the alitrunk with a full complement of flight sclerites and the head with ocelli present. HW slightly greater than maximum width of mesoscutum. With alitrunk in dorsal view the pronotum not forming part of the dorsum. Mesoscutum longer than broad. Axillary sclerites large and subtriangular in dorsal view, separated medially by a short impressed area between them. Parapsidal grooves faint. Forewing with cross-vein *m-cu* present.

MALE. Unknown.

Only a single species is recognized in this group at present, *latinode*. The combination of characters listed above isolates it from all other *Monomorium* species-groups, and the combination of 5-dentate mandibles and PF 3,3 is immediately diagnostic.

M. latinode is known from several countries bordering the Indian Ocean but most samples which are available for examination come from India and Sri Lanka. Its presence in Borneo, Tanzania (Pemba I.) and New Zealand (Wellington and Auckland, where it was found in the hold of a ship), as well as its occurrence on Christmas Island in the Indian Ocean and Hawaii in the Pacific (Wheeler, 1935), implies that *latinode* has tramping ability and has been spread considerably by commercial activity. The Indian subcontinent presumably represents its area of origin; Wilson & Taylor (1967) state that its native range extends from Sri Lanka to Taiwan and south to Java and Sumatra.

Monomorium latinode Mayr

(Figs 99, 100)

Monomorium latinode Mayr, 1872: 152. Syntype workers, EAST MALAYSIA: Sarawak, 1865–66 (*G. Doria*) (BMNH) [examined].

Monomorium latinode var. *bruneum* Emery, 1893*b*: 243. Syntype workers, SRI LANKA: Kandy, i–ii.1892 (*E. Simon*) (MCSN) [not seen]. **Syn. n.**

Monomorium voeltzkowi Forel, 1907*b*: 78. Syntype workers, TANZANIA: Pemba I., Chake-Chake (*A. Voeltzkow*) (MHN; MCZ) [examined]. **Syn. n.**

WORKER. TL 2·6–3·2, HL 0·68–0·88, HW 0·52–0·75, CI 76–87, SL 0·52–0·64, SI 85–102, PW 0·36–0·50, AL 0·77–1·00 (20 measured).

With the species-group characters given above. All dorsal surfaces of the head and body with numerous erect to suberect fine hairs. Scapes and middle and hind tibiae with numerous projecting long hairs which are erect to suberect; the longest of these hairs equal to or exceeding the maximum width of the scape or tibia from which they arise. Head and promesonotum unsculptured except for hair-pits, propodeal dorsum transversely finely rugulose or costulate, the sculpture sometimes faint. Petiole, postpetiole and gaster unsculptured. Postpetiole conspicuously swollen in profile (Fig. 100). Colour variable, ranging from uniform brownish yellow to uniform chestnut brown. Usually the gaster dark brown, the head and alitrunk brownish yellow to dirty yellow; sometimes the head darker than the alitrunk but not as dark brown as the gaster. Maximum diameter of eye 0·19–0·21 × HW, with 7–9 ommatidia in the longest row. Simple

allometric variation present. In the individuals used to obtain the standard measurements given above three trends were noticeable, as follows.

As HW increases, SI decreases (in HW interval 0·52–0·56, SI is 102–98; in HW interval 0·57–0·67, SI is 97–90; in HW interval >0·70, SI is <80).

As HW increases, CI increases (in HW interval 0·52–0·57, CI is 76–79; in HW interval 0·60–0·64, CI is 80–82; in HW interval 0·66–0·75, CI is 84–87).

As HW increases, relative size of eye decreases (at HW 0·52, maximum diameter of eye is 0·21 × HW; at HW 0·61, maximum diameter of eye is 0·20 × HW; at HW 0·75, maximum diameter of eye is 0·19 × HW).

The 3,3 palp formula and presence of 5 teeth on each mandible immediately separates *latinode* from all its Afrotropical congeners, where the PF is 2,2 or less and the maximum dental count is four. Apart from *latinode* species with 5-dentate mandibles occur in the Malagasy, Indo-Australian and Australasian regions, and the closest relatives of *latinode* will most probably have to be sought among the little known *Monomorium* species of those regions.

In the synonymy given above I have not seen type-material of *bruneum* but Emery used only the uniform darker colour of his Sri Lankan specimens to separate them from the lighter type-series of *latinode* from Borneo. As discussed above other series show intermediate colours between these extremes, so I have relegated var. *bruneum* to the synonymy. *M. latinode* and *voeltzkowi* are absolute synonyms.

Material examined

Afrotropical region. **Tanzania**: Pemba I. (*A. Voeltzkow*).

Other regions. **Sri Lanka**: no loc. (coll. F. Smith). **India**: Tamil Nadu, Mudumalai Anim. Sanct. (*J. S. Noyes*); Mudigere (*J. S. Noyes*); Karnatake, Dharwad (*G.R.*); Nilger (coll. Donisthorpe); no loc. (coll. Bingham). **East Malaysia**: Borneo, Sarawak (*G. Doria*). **New Zealand**: Auckland (in hold of ship); Wellington (*H. R. Pallas*). **Christmas I.** (Indian Ocean).

Nomen nudum

Monomorium orientale var. *africanum* Forel, 1907: 78 (attributed to Mayr).

No description was appended to the name *africanum* by Forel, who attributed it to Mayr. Such a name was never published by Mayr and no specimens bearing the name have been detected in the Forel collection (MHN).

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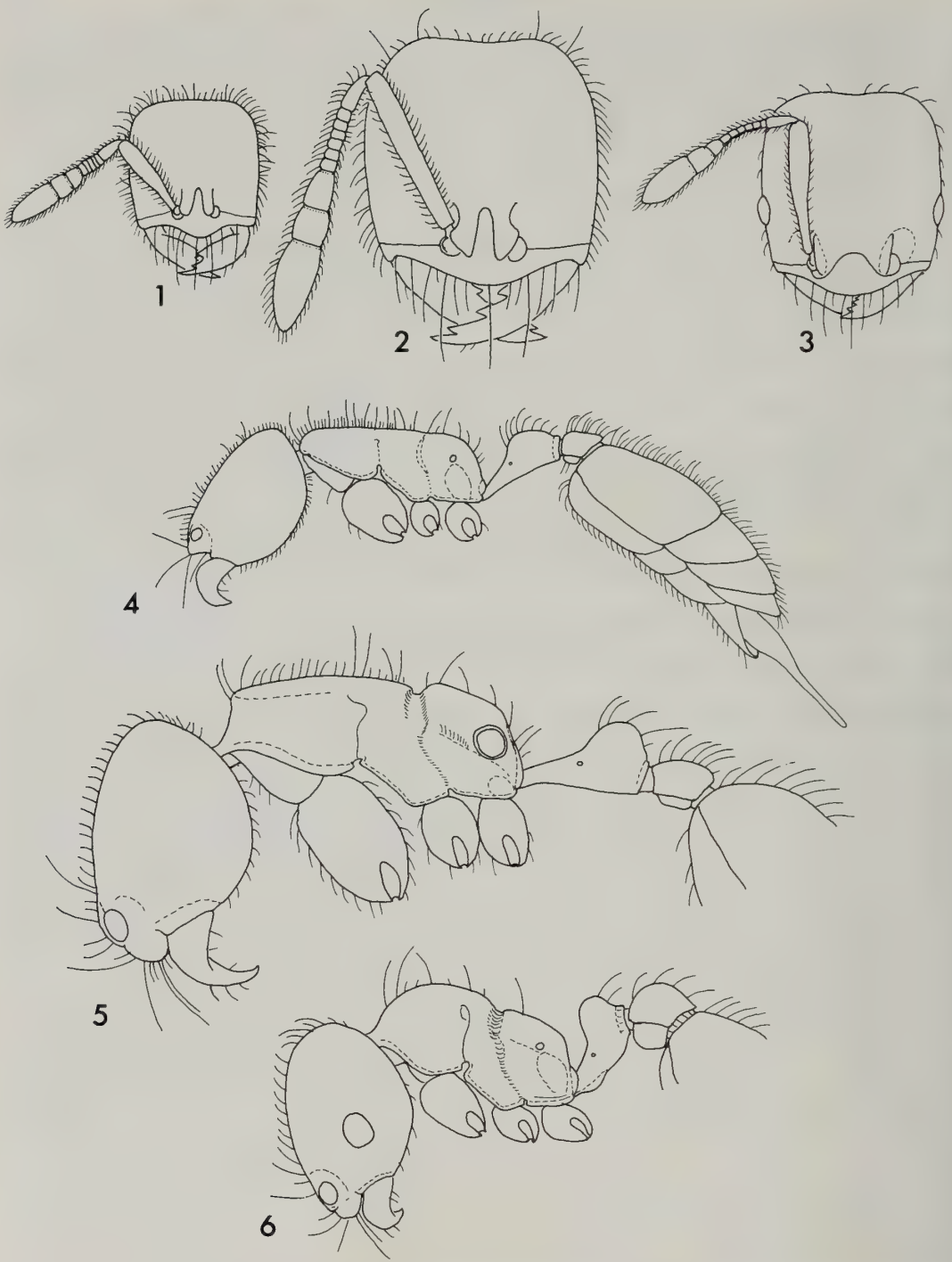
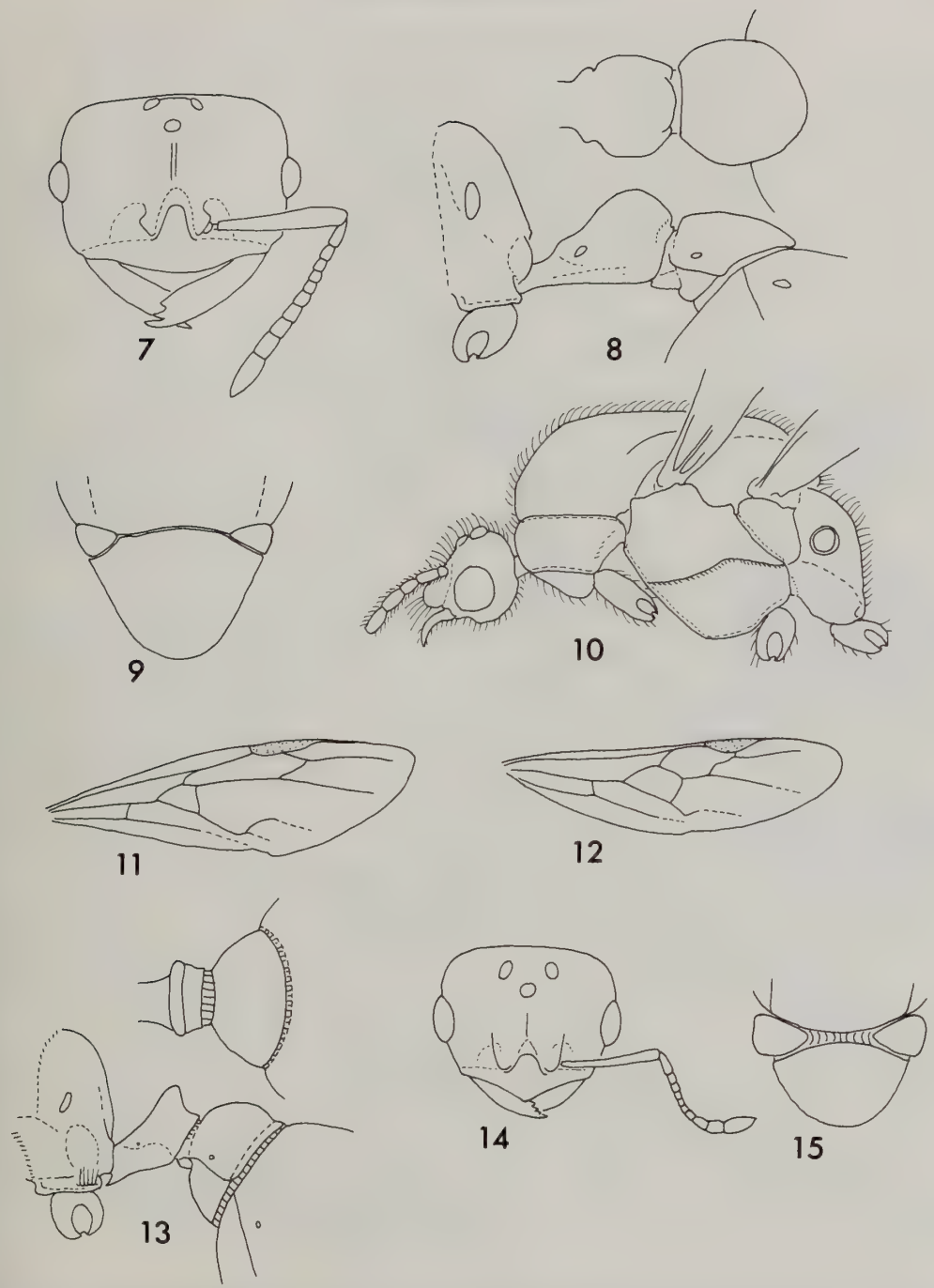


Figs 1–6 1–3, heads of workers: (1) *Anillomyrma tridens*, (2) *Bondroitia lujae*, (3) *Diplomorium longipenne*. 4–6, profiles of workers: (4) *Anillomyrma tridens*, (5) *Bondroitia lujae*, (6) *Diplomorium longipenne*.



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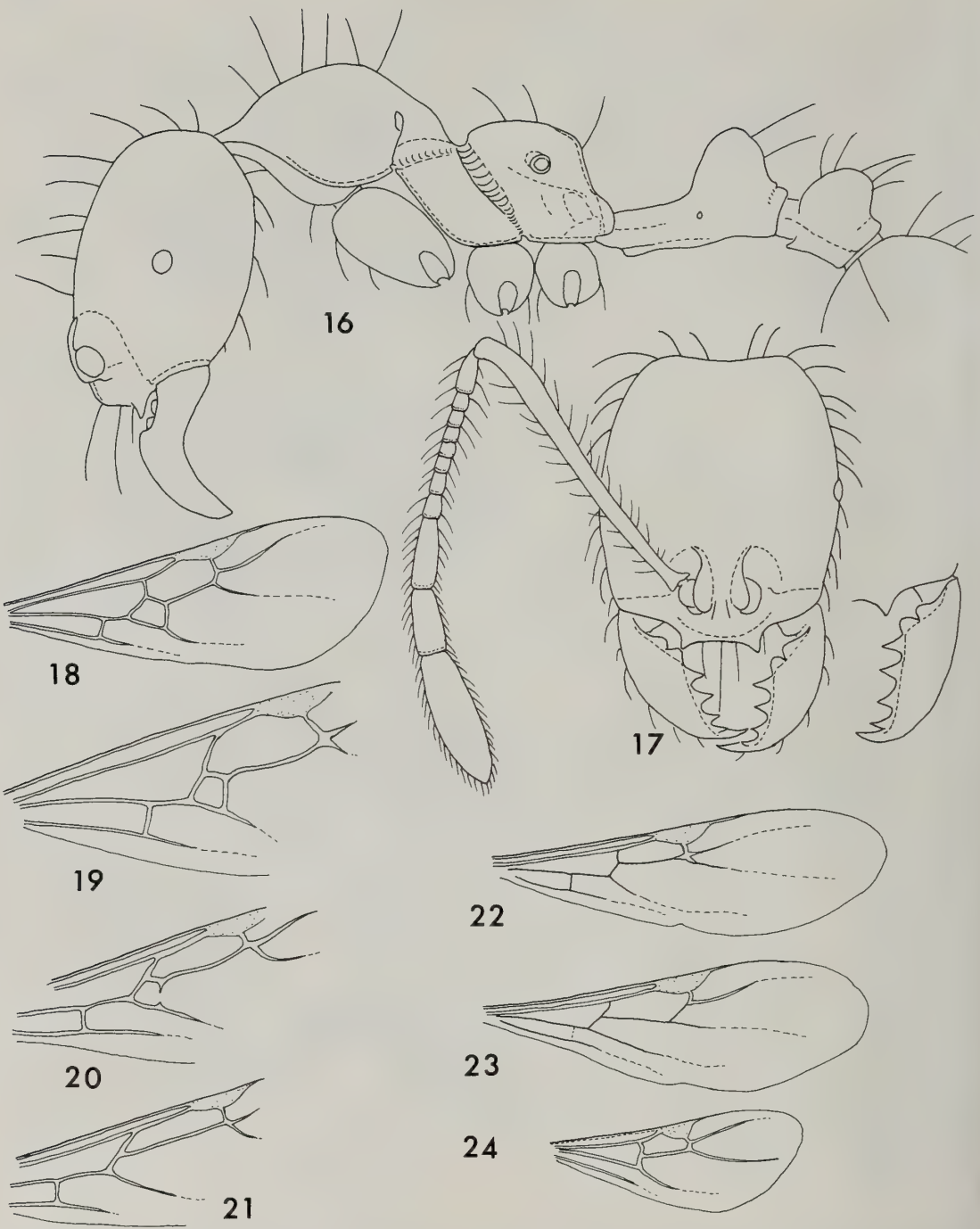
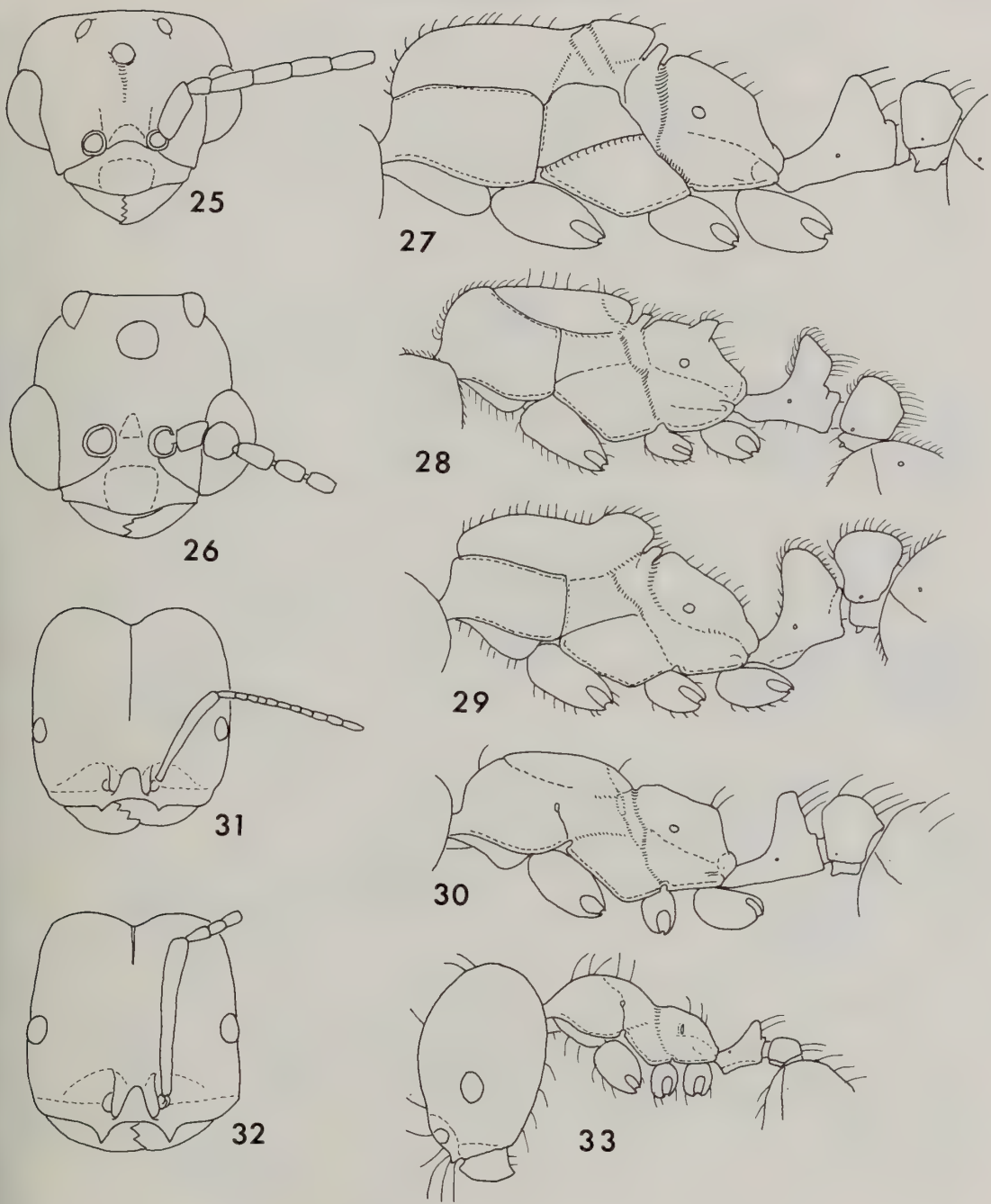
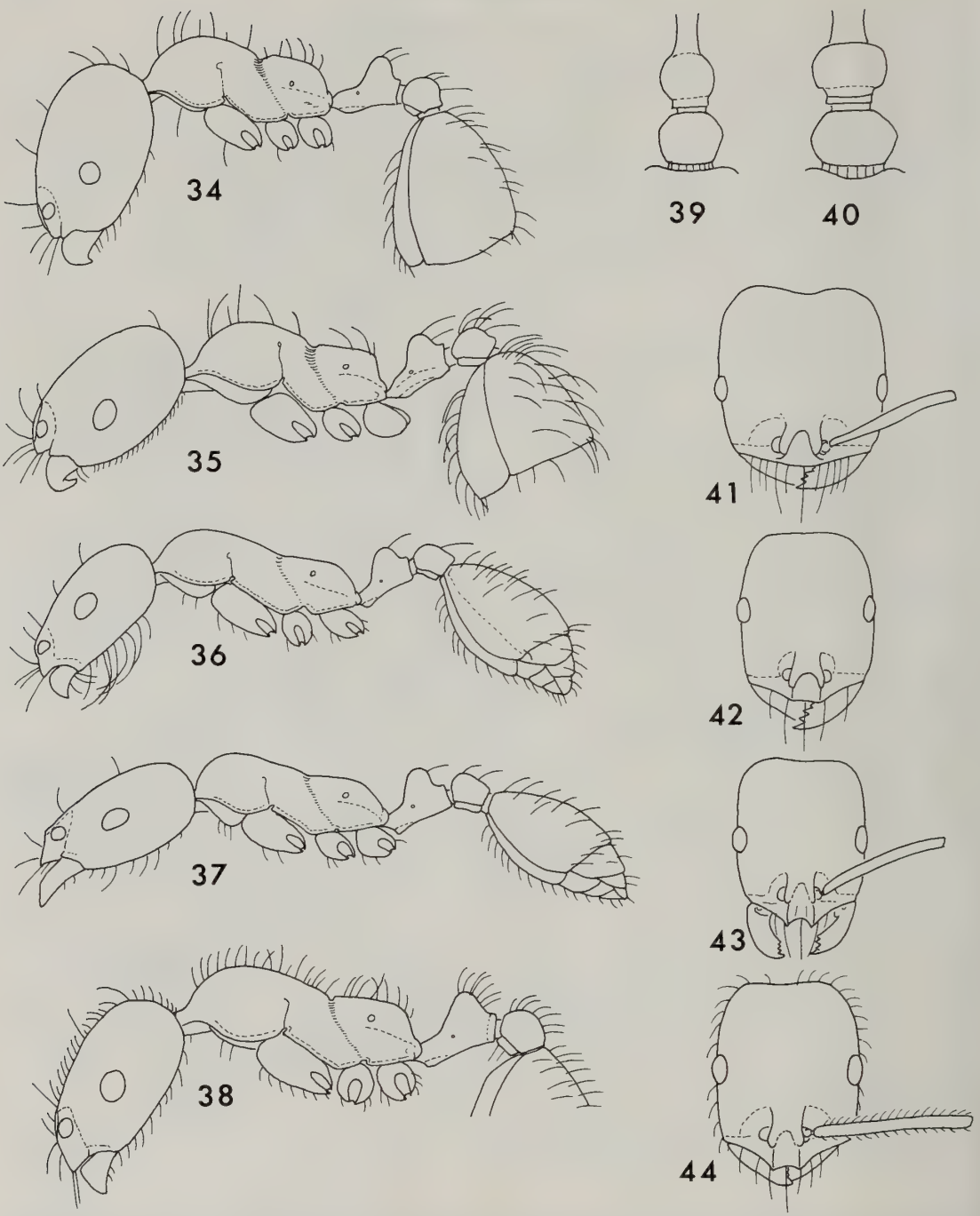


Figs 16–24 16–17, *Epelysidris brocha* worker: (16) profile, (17) head; offset shows mandible with head tilted backwards. 18–24, venation in *Monomorium*: (18) *antarcticum*, (19–21) to show loss of *m-cu* in *scabriceps*- and *destructor*-groups, (22–24) to show loss of tubular veins and *cu-a* in (22) *indicum*, (23) *fastidium*, (24) *pharaonis*.



Figs. 25–33 *Monomorium* species. 25–26, heads of males in (25) *salomonis*-group, (26) *scabriceps*- and *destructor-groups*. 27–30, profile of alitrunk in females of (27) *rufulum*, (28) undescribed species near *hesperium*, (29) *medinae*, (30) *advena*. 31–33, worker of *abyssinicum*: (31) head of major (HW 1·84), (32) head of minor (HW 0·92), (33) profile of major. (Pilosity omitted in 25, 26, 31, 32.)



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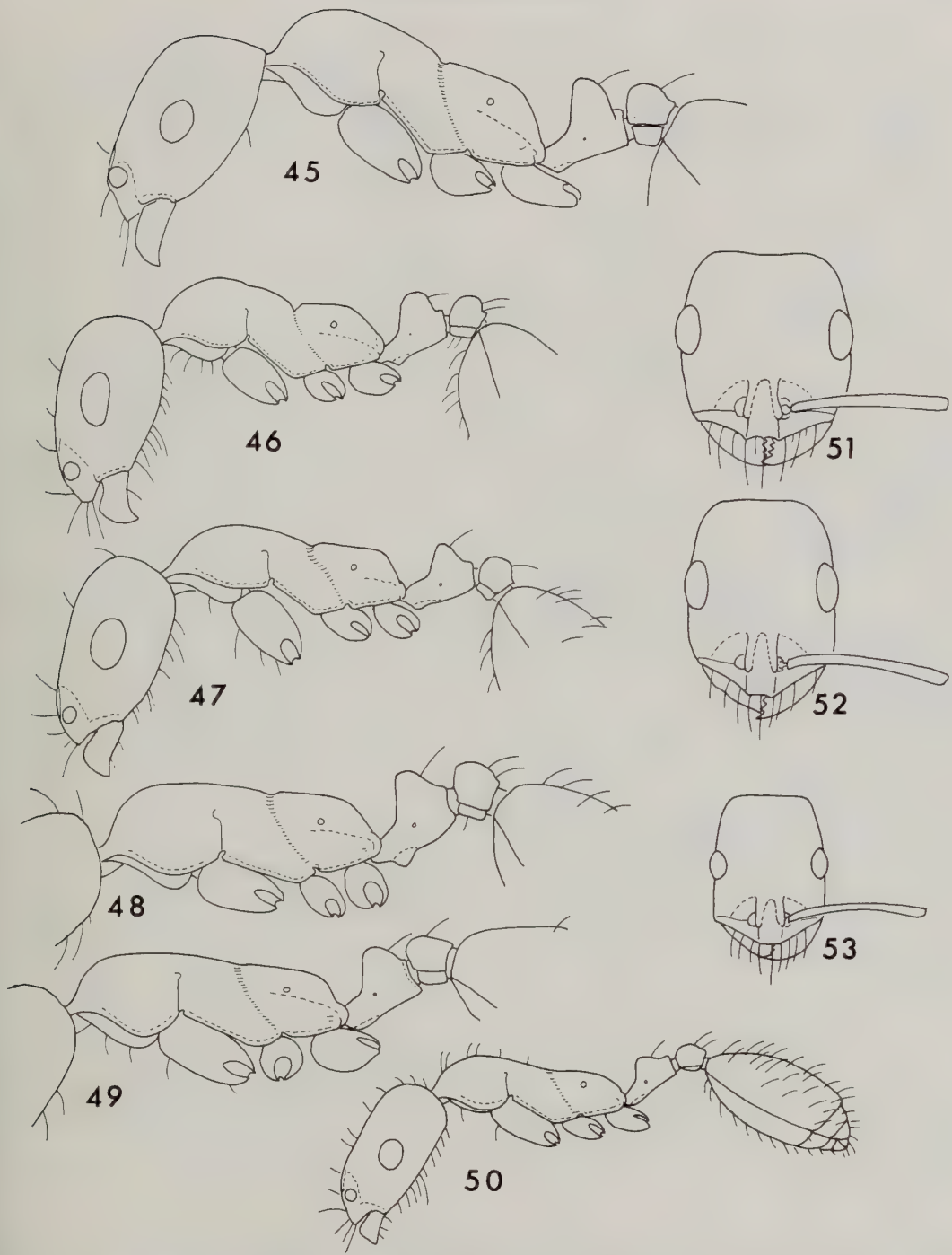
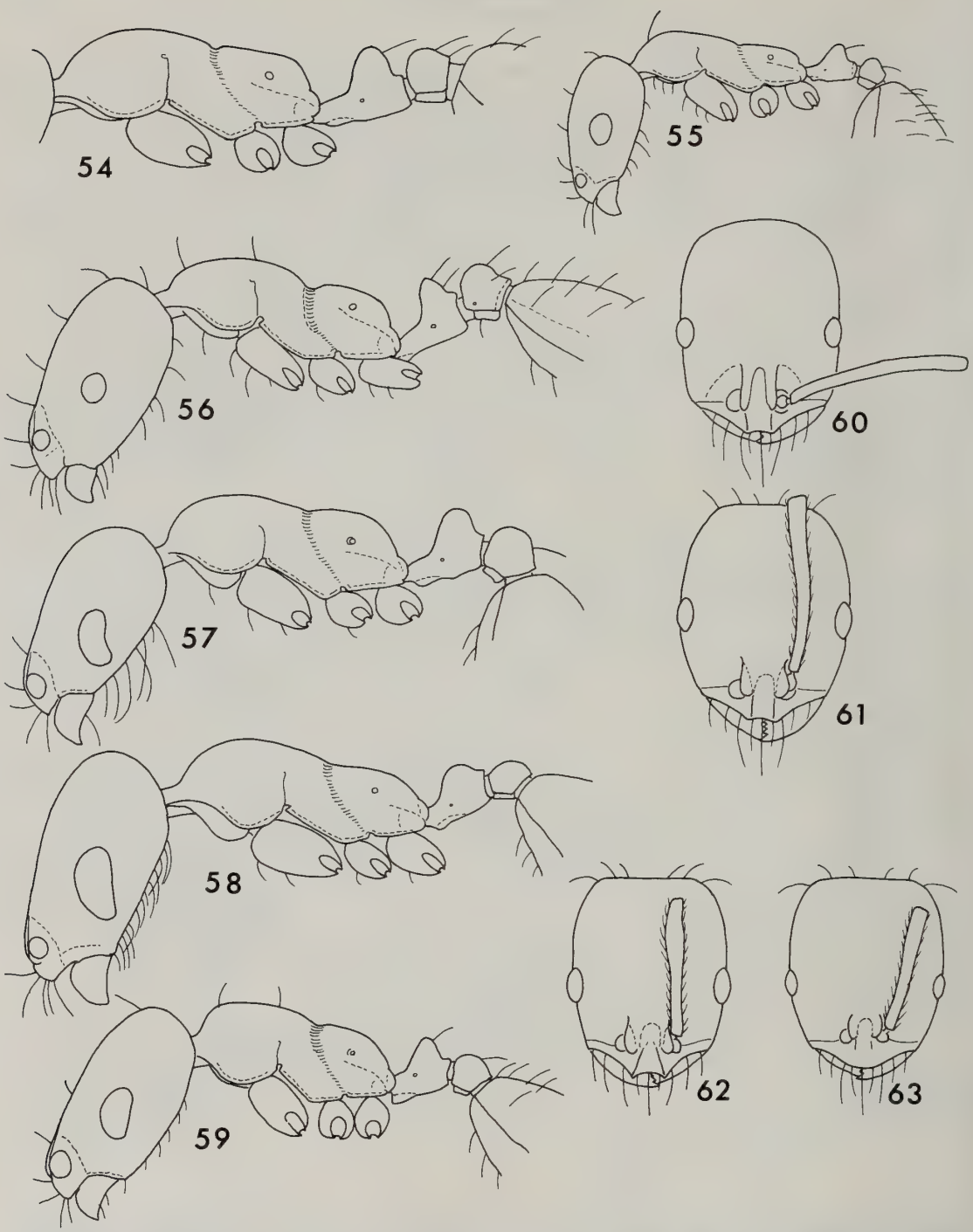


Figs 45–53 *Monomorium* workers. 45–50, profiles of (45) *afrum*, (46) *areniphilum*, (47) *viator*, (48) *drapenum*, (49) *kitectum*, (50) *marshi*. 51–53, heads of (51) *areniphilum*, (52) *viator*, (53) *marshi*.



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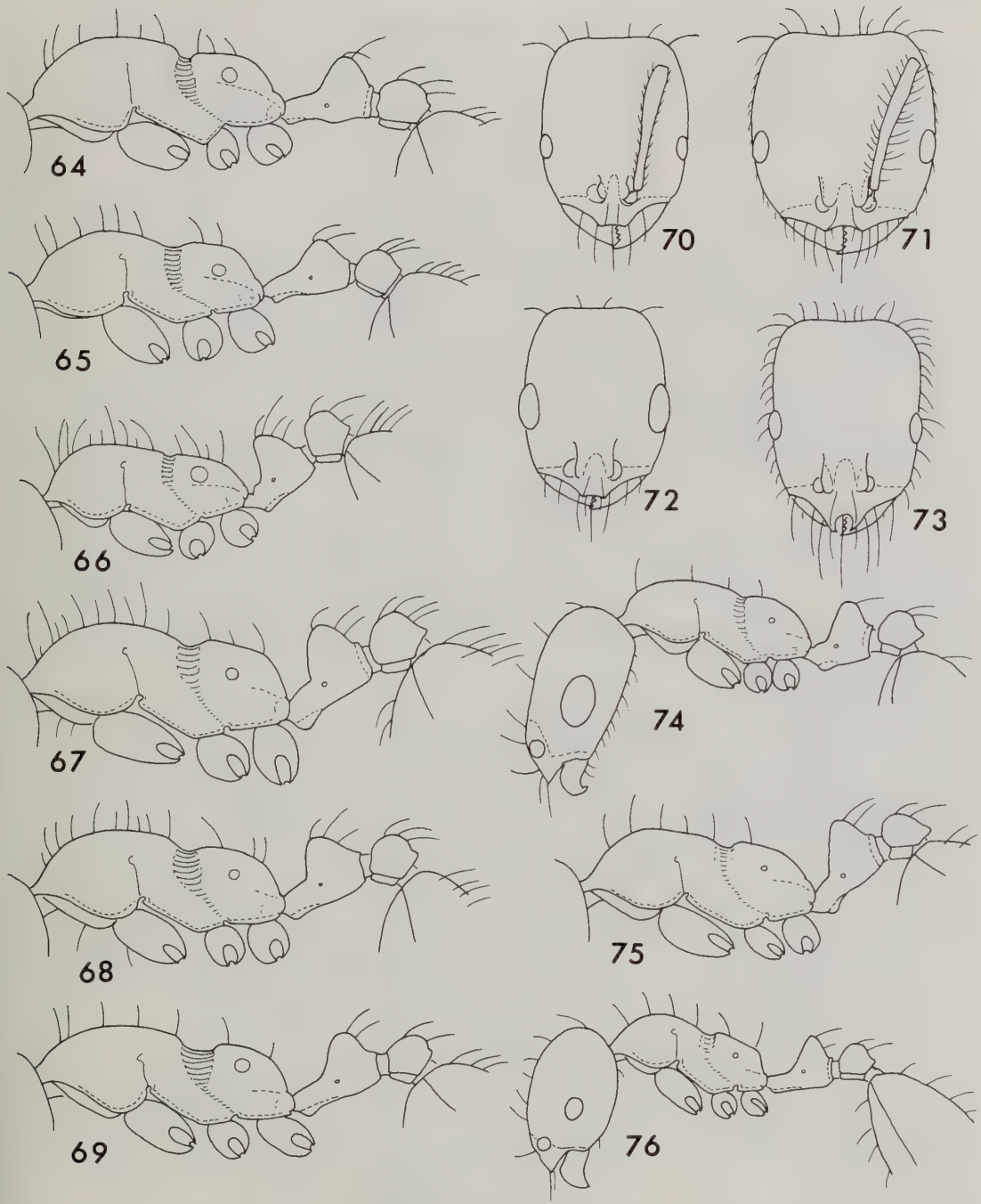

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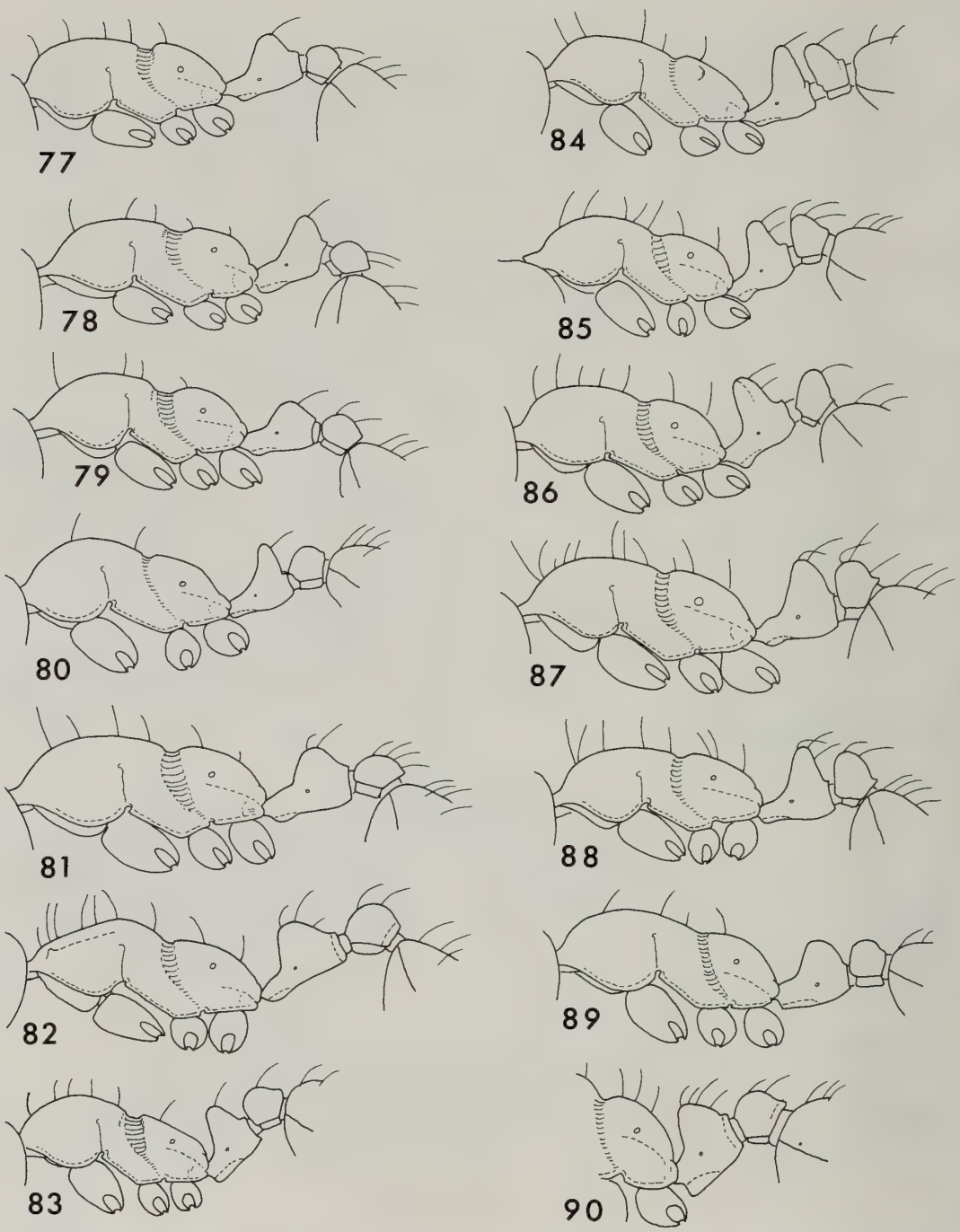

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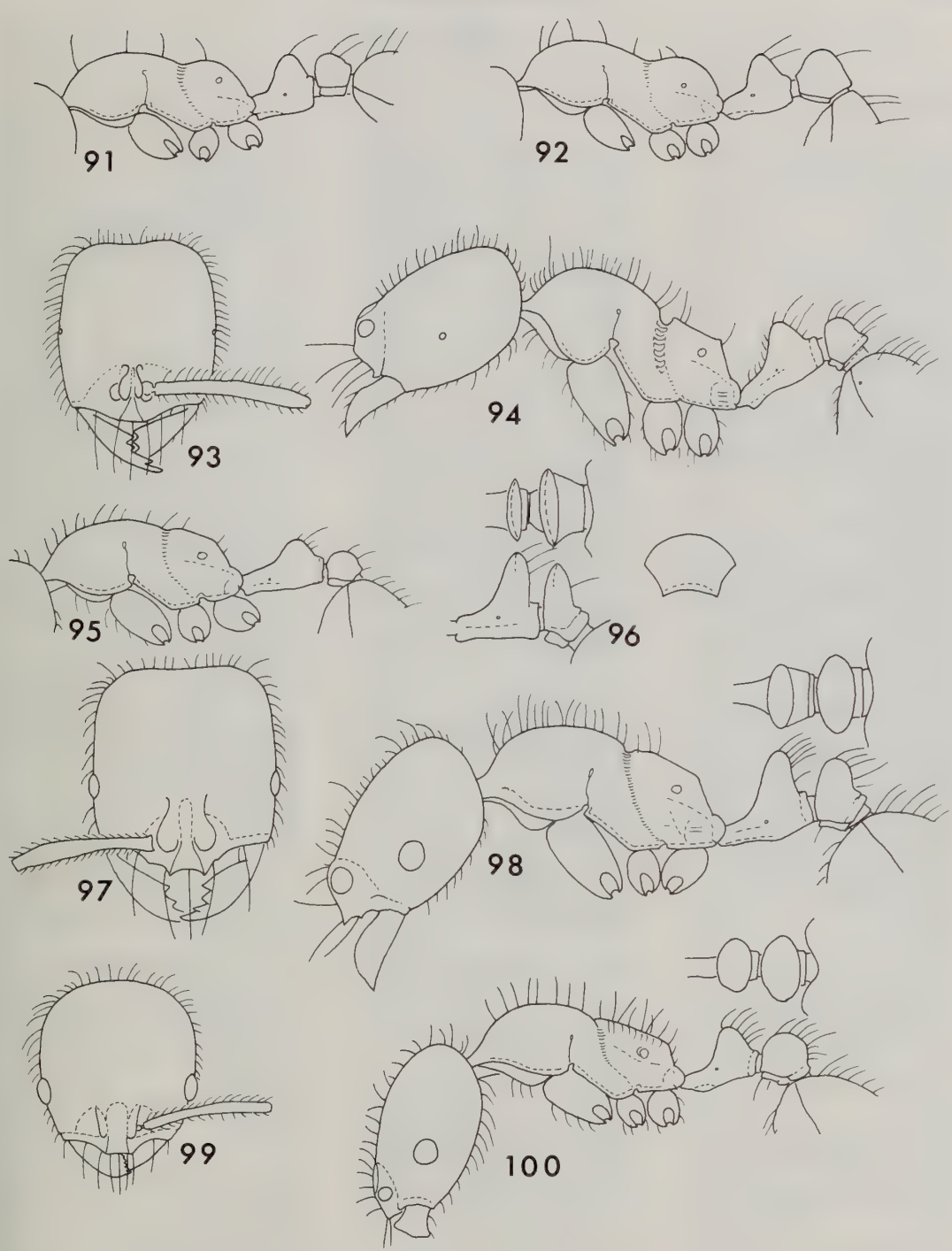

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